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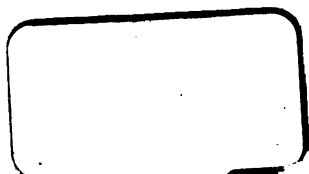
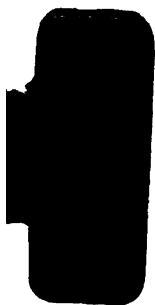
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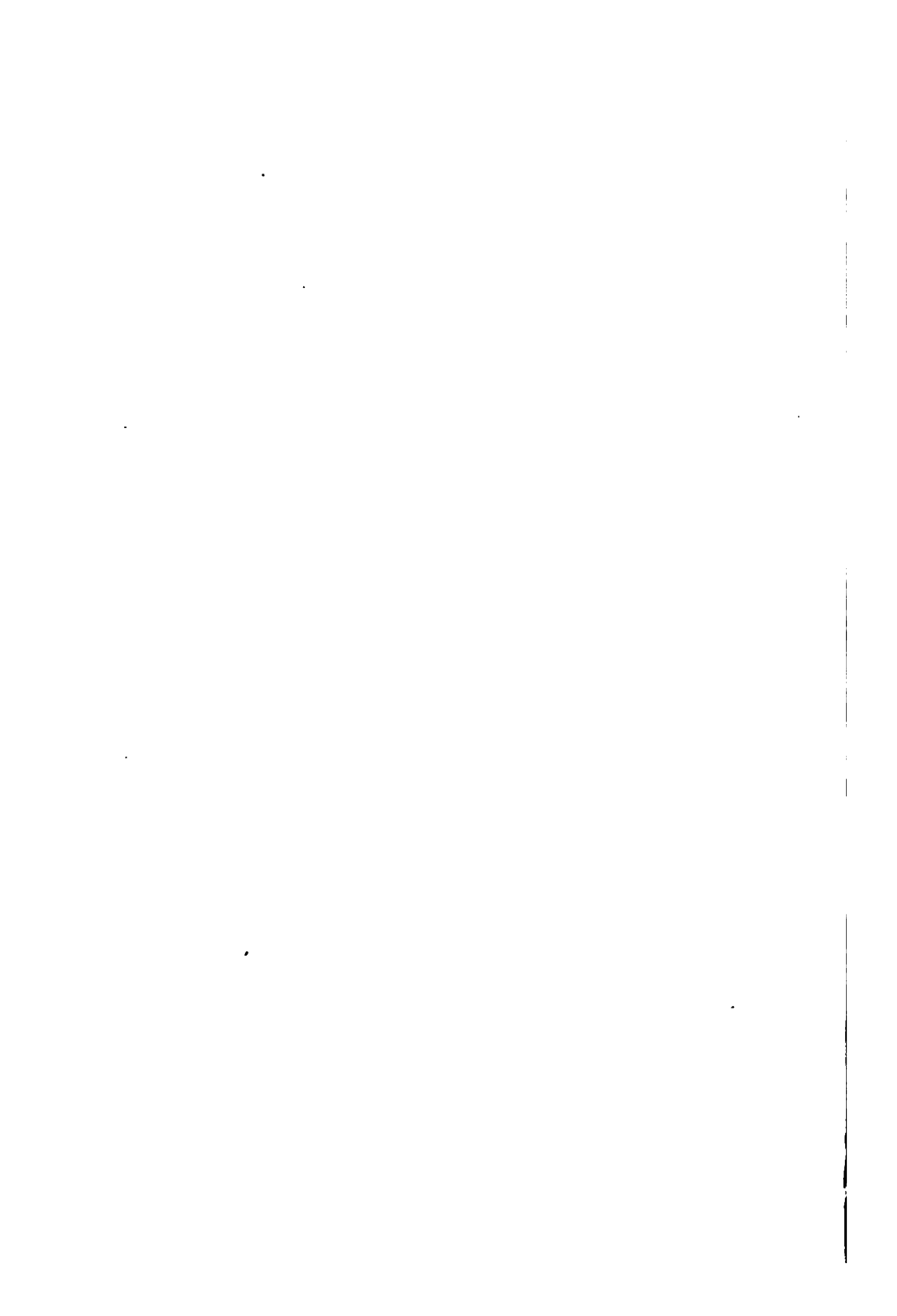


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Alexander



THE SOUL AND ITS BEARINGS

SHOWING

*The Material Quality of the Soul, and the
Mechanical Nature of its Functions, and of
the Business Relations It Sustains with
the Environment on One Side, and
the Rest of the Corporal
Organism on the Other.*

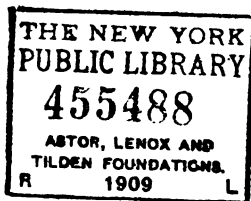
By *James B. Alexander*

AUTHOR OF *THE DYNAMIC THEORY*

MINNEAPOLIS, MINN.

1909

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Preface

The kind of people for whom this book is designed are those who can understand a plain proposition in practical mechanics, shorn of technicalities, and abstruse terms, and clear of mysticism and metaphysics. Like so many of the great and absorbing questions that demand our attention, its explanation, if it really explains, is simplicity itself. If it is not simple it had better be looked into again.

In prosecuting this work, I occasionally found myself confronting some of the great lights of metaphysics. It is doubtless a perilous position to be in; but I reflected that neither the facts of science nor the truths of philosophy are to be established in the long run by the authority of great names. Not seldom these great names have blocked the way of advancing progress. Newton's was one of these. His theory of light is now known to be entirely wrong, but few dared to say so while Newton lived. The followers of great leaders are always more or less hypnotized and on that account often disqualified from rendering unbiased judgment in the face of their Master; and it will often be found in the interest of truth to confront and resist rather

than to follow. Facts have often survived authority—indeed they generally do. But sometimes the Doctors are on our side, and we feel better. It is especially gratifying to find Spencer in agreement on the leading thesis of this book; viz., the correlation, correspondence and identity between the mental and physical forces. (See chap. 8.)

The origin, nature, and destiny of the Soul have puzzled the brainiest and the best, from Pythagoras to Joe Smith, with their solutions as wide apart and grotesque as the transmigration of the former and the celestial generation of the latter. Clear ideas on the nature and functions of the soul are pretty scarce. As to its destination, there is a pretty general belief in a hell of roasting torment, to which every one can consign his enemies, and a heaven of delights reserved for himself and his friends. These demoralizing dogmas have done our race incalculable mischief—more than plague, pestilence, famine and war all put together. That the average psyche is sadly in need of education, is proved by the smallness of the number, who are eager to know what it is, and what is going to become of it. There are too many people who tacitly allow a few interested and officious leaders to think for them in matters of religion and philosophy. They do not realize what this service costs them. The time and money incidentals, represent but a fraction and cannot be numbered with the wretched doubts and nerve destroying uncertainty, and dread of the future, that ever attends the doctrine of immortality. Ecclesiasticism reduces doubts to dollars, and this, it must be admitted, is a real service in the present state of intel-

lectual development, at any rate, better than nothing, one that will continue to be in demand till the dogma is supplanted by the truth. What a wonderful, virile constitution has truth!

Alas, so has error. But truth shall make you free, while error rivets your shackles tighter every day.

Of course it is not possible to discuss the soul without taking some account of its **bearings**. But to do this exhaustively is to traverse all the highways of thought, and to prove all the results of experience. For the bearings of the soul are coextensive with its possible knowledge. Its limit brings us to the edge of the knowable universe. It has no bearing outside of relations. The mythical postulates planted out there by metaphysics, never come up. But the relations the soul sustains towards objects outside of itself are infinitely more numerous, more intimate and more intricate than those borne by any other organism we know of. These associations and relations unmistakably prove the quality and kinship of the soul to be the same as those of its associates. It could not crowd and jostle and push the companions of its intimacy and be jostled by them unless they were all of the same general constitution. They are all made up of the same material elements and like them, are, in due course, dissolved and dissipated.

I think the reader who will closely attend to the argument, can hardly fail to see the impossibility of any relation between the real things we know including ourselves and our souls; and the unreal things postulated as realities by the metaphysicians, and necessary to figure as such, in their supernatural

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Preface

speculations. The conclusions that we reach are not optional and are not fixed to suit our views or wishes, but are developed according to the necessary conditions of Nature. Our preferences cut no figure whatever. If we were consulted, doubtless many of us would vote for the abolition of death, also the abolition of poverty, sickness and pain. We might prefer to choose our parentage and land of nativity.

But we shall see that if pain were to be abolished, the motive power that drives the race would be gone, and Nature would do with us only as she does with other stones and clods.

Is it right to lie for the concealment of a disagreeable truth—to enclose the vital truth in a “pleasant husk of fiction,” by tricking the people with the delusion of agreeable falsehoods? **No! tell the truth!** Let not the truth be brought into disrepute by unworthy and debasing associations.

It is no use to mince matters or to pretend things are not so bad as they are. There has been and still is too much of that. Neither shall we represent things worse than they are. If we know the truth, we can learn to adapt ourselves to it. If we cannot find the truth, we naturally adapt ourselves to false and unreal conditions, works of the imagination. Educated in false learning when it fails us, as sometime it will, and when with blinking eyes we are confronted by the light of truth, will we be able to recognize her? It is sometimes affirmed that a lie well constructed and loyally adhered to, is as good as the truth. That is not possible. But the efforts that have been made to adapt our beliefs to cunningly

devised fables have met with such success as to raise doubts of the sanity of the race.

He is a bold, desperate and dangerous character that takes upon himself the appalling responsibility of lying to a world full of anxious, inquiring and credulous souls.

I am under no constraint or obligation to apologise for Nature. Poor thing, she does the worst she can—and the best. The ancient mythology mongers came nearer the truth than they realized when they made all Nature and even their gods subject to the Fates. Nature was always subject to the conditions of her existence—an endless and a beginningless succession of forms and energies. Fated, because condemned to everlasting change and everlasting repetition. She was not born that way—she always *was* that way—she never was born.

The energy of matter in endless procession forms the concatenation of forces of which we predicate the doctrine of the conservation of matter, motion, and finally energy. This is the doctrine of the perpetual equivalence of forces; the doctrine that all the energy in existence today, is equivalent to all the energy that was in existence yesterday, and all that exists as the energy of today will become the energy of tomorrow. The energy of yesterday no longer exists, that of tomorrow has not begun. There is no other energy than that of the present instant, and there never was and never will be an instant during which the energy of the universe measured in C. G. S. units, or foot-pounds or avoirdupois tons can possibly aggregate an ounce more or an ounce less. The forms and qualities of these multifarious energies are not the same for

two moments in succession. But the amount and equivalence is forever true to a grain.

Now because the forms of the things that move, and by consequence the peculiarities of their motions are all different, Mr. Spencer says, the forces displayed by these forms do not persist, and declares that the force of which he asserts persistence, is the **Absolute Force**. An inconceivability.

Thus, Mr. Spencer attempts to snatch from science her most splendid generalization; the doctrine of the conservation and equivalence of forces, and to give to her in exchange an illogical and unprovable religious dogma.

He calls that the reconciliation of science and religion!

I wish to emphasize beyond a doubt the conclusion we reach in the chapter on immortality.

The soul dies, not because its home in the skull is wrecked, but because it is proved to be a material and therefore a mortal substance. It is in intimate relations with the environment through the very physical nervous system and shares with it, its functions and its destiny. But it is not the name it goes by, but the physical work it does that gives it character and quality.

It matters not where its seat is, the vital fact is that it is the part that feels and thinks, and that by consequence of that very fact that it does feel and think, and since feeling and thinking are proved to be physical functions, it follows that this is a material body upon which we cannot predicate other than a mortal destiny.

It is mortal not because it is allied and associated with other organs that are mortal, but because it is

itself constructed of material substance and if it had no relationship with, or dependence on, any other organs it must from its very material nature succumb and perish in due time like all the rest. The question is not whether the brain shares the dissolution of the body; that will be admitted. But our proofs settle in the most positive manner that the part or parts that feel and think are of such like mortal constitution and meet the same end, and must do it, independently of the question, with what other part of the body it or they are in the most intimate relations; whether the nervous system, the cerebrum, the solar plexus, the pineal gland, the sacrum, the heart—or all of them. The soul may be the first to die as well as the last. Its dependence on the others is not greater than their's on it.

I have not enlarged upon the doctrine of Evolution for the reason that it is no longer in question. No body that really understands it, doubts it. But many who think they believe it do not understand its first principles. Such is the overwhelming nature of the proofs of its truth that an acquaintance with half of them is sufficient and to most folks satisfying.



CHAPTER I.

The Soul and its Bearings.

INTRODUCTION.

Virgil in his veracious story of the Aeneid, relates that when his hero Aeneas descended to the Infernal regions, a locality underlying a part of Italy, he met with a couple of bad characters, remarkable not so much for their crimes as for the manner in which they were punished. One of these was named Tantalus. He had been a bad king of Lydia. He was punished by being immersed in water up to his neck, yet, although tormented by an intolerable thirst, he could not drink for whenever he bent his head down to reach the water it receded from his lips. Moreover, delicious fruits hung all about him, and trays loaded with the most delicate and tempting viands floated around and near him. Yet, whenever he attempted to reach any of them, they always

receded or were wafted beyond his reach; so that although tortured by the pangs of hunger, he was forever unable to satisfy it.

The other one of these bad characters was named Sisyphus. He had been a notorious robber and traitor very clever and skilful, and he was punished by being compelled to roll a big stone up a hill, which as soon as he got it to the top, always got away from him and rolled to the bottom again, so that although he constantly accomplished his task, it was always still to be done.

The whole human race may be divided into two classes, with respect to their fortunes in life, viz.: the unsuccessful and the successful.

The former live in constant disappointment. They are forever looking forward to something better, but never attain it. They are always hoping, but never realizing. Fortune perpetually holds out to them the most alluring and dazzling prospects, but always mocks them by snatching from their reach the good things she pretends to proffer.

So they pass through life, restless, uneasy, unsatisfied with the past and the present, but still trusting to the treacherous future; and upon reaching the end, often, with a faith that refuses to learn by experience, with a charity for Fortune that no act of hers toward them ever justified, they transfer to a post mortem existence the realization of the hope she has ever flouted in

These unsuccessful people who are forever
g, but never getting anywhere, forever at-

tempting and never accomplishing, forever reaching but never grasping; are like poor Tantalus, but not always so badly off as he, for he had the misfortune to be wicked as well as to be punished, while they as a general thing are only punished without being wicked. We may call this class of folk the Tantalusians. They constitute the great bulk of the race.

The successful class constitutes a small minority of the race, but they are the envy of the Tantalusians. In most that they do, they seem to thrive and succeed. Like Sisyphus they generally manage to get their great stone to the top of the hill, but like him too, they generally lose it and have their toil for naught. If they appear to hold what they get, we discover by looking beneath the surface that it is only an empty case or shell that they are grasping, and that the substance, the kernel, the meat, the milk, has oozed out. If they get wealth they find that it brings with it the elements of discontent and does not give the satisfaction they expected.

We shall discover as we advance that this restless queer and unsatisfactory condition of things is a necessary result of government of beings possessed of feelings, by means of feeling. No action in consciousness can possibly take place except as a means of getting rid of a feeling. In order that it is desirable to get rid of a feeling, such feeling must be one of pain or uneasiness. In order to get the race to move, nature appears to have invented many ways to make it miserable; by exposure to hunger to the elements, to the

enmity of most other animals, to individual competition and rivalry.

Since pain is the only moral incentive to motion and motion is the object and end of the feeling of pain it must follow that motion is, or is the cause, of pleasure, therefore pleasure is not an incentive to motion. It is only relative pleasure. Motion gives rise to feeling less inharmonious when its result is not utterly disappointing. But commonly it is disappointing and after the motion is over we are no more satisfied than before. So we are constantly driven on—"move on" is the constant order of nature.

If we ever reach a comparatively still place and think now we have rest, very soon something comes along to disturb it and make us uneasy and put more motion upon us. Even rest itself becomes uneasy and irksome.

The effort that we make in any given case, is for the purpose and with the effect of getting rid of the feeling that antecedes the effort. That is, each feeling that prompts to action commits suicide. A feeling being energy in a potential position, it tends to unwind and become kinetic, and as soon as it does unwind and become another form of motion, it ceases to be feeling. Therefore every feeling that leads to motion gets rid of itself. The environment full of energy in every form assails the organism constantly in many ways and so is continually setting up feelings in the soul. These are no sooner set up than they begin to make away with themselves, by turning themselves into nerve currents. Purposes and inten-

tions arise from the interactions and elaborations of the simple primary sensations injected into us by the environment, and they, although they may be removed of the second, third or twentieth degree from these primary or elementary sensations, partake of their nature, and do not and in the nature of things could not ever be else than forms of energy on a strain; or in potential position in a struggle to release themselves and become the motion of some other body than the soul or psychic substance.

In the economy of nature the only advantage of feeling is the development and preservation of a thinking **machine**.

The processes of the various energies are carried on by their mutual interactions throughout all departments of nature; matter jostling against matter constantly losing and acquiring motion. It is all purposeless. Purpose can originate only in connection with feeling, and feeling is evidently a function limited to matter of small bulk and peculiar organization. With matter so organized as to develop it, feeling becomes a factor, a guide, a director, an arranger to a definite or uniform end, of the energies by which it is surrounded and accompanied like a master mind in a crowd or a general in an army, or better still the master of a school.

We have seen how quickly the actions including the thoughts, become wild and purposeless and self neglecting, when feeling is off duty in all cases **except** those of the most firmly grounded instincts. This exception is our key.

It shows us that action repeated an indefinite number of times for the purpose of getting rid of a perpetually recurring feeling, finally succeeds in doing it and may become a habit so well settled as to continue to be repeated after the feeling has become finally eliminated.

CHAPTER II.

The Soul Defined.

Webster defines soul to be "The spiritual, rational and immortal substance in man which distinguishes him from brutes, that part of man which enables him to think and reason, and which renders him a subject of moral government." Then turning to the word "spiritual" we find it means "consisting of spirit, not material, incorporeal, as a spiritual substance or being. The soul of man is spiritual." Now what is spirit? Webster says: "Primarily, wind; air in motion; hence breath." His fifth definition is "Soul of man" and in the sixth he says it is "An immaterial intelligent substance" and Locke is quoted as saying "spirit is a substance in which thinking, knowing, doubting and a power of moving, do subsist."

There seems to be no clear distinction between soul and spirit. They are both called substance, yet incorporeal and immaterial, a proposition that to my mind is unthinkable. Then, soul is defined as the immortal substance in man so that when we find an immortal substance, we will easily

recognize it as soul. It is a substance in man that "distinguishes him from brutes." Naturalists have never found in man any such substance. Man is competent to do many things not done by brutes but this results from a better organization and difference in form of the same sort of substance. Men differ from brutes as they differ from each other. Webster says the soul **enables** a man to think. If it only enables **him** to think what is the part of him that thinks? The soul according to this would be one part of him, and "him" would be another part or perhaps the whole of him. Somewhere there must be a **part** that **thinks**; a substance in which the motions called feeling, thought, perception and reason are begotten and developed. There must be some part that not merely enables something else to think, but that thinks, and feels.

To use these words without a fixed definition is certain to lead to confusion and misunderstanding. I have chosen to define the part of man that thinks as the **Soul** or using the Greek term, the **Psyche**. Then the motions that constitute **feeling** **thought** and **will**, I name collectively the mind. Thus feeling, thought and will, with the other affections or sub divisions or terms of mind such as reason, perception, ideation, consciousness, are all modes of motion or a mode of motion with modifications, of the soul or psyche.

The mind is not a thing but a force such as that called the waving a handkerchief or a flag; while the psyche is the material substance—a part of the body the agitation of which by another

body on the outside, gives rise to the motions we call mind—feeling, etc. So the soul or psyche is a part or organ that feels and thinks. The process of feeling or thinking is a form of movement of the psyche or psychic substance. We must be careful to distinguish between the body that moves and the motion that it makes. The first is the soul, the second is feeling, thought, mind.

CHAPTER III.

The Six Senses.

All of our knowledge of the external world we get by means of the six senses, viz.: Touch, Sight, Hearing, Smell, Taste and Muscular sense. The evolution of these senses came about probably in the order in which they are named here, touch being first and muscle sense last. The evolution of organisms has been brought about by the action upon bits of protoplasm by other bodies in various states of motion. The lowest order of life is a sort of slime called protoplasm. The constitution of protoplasm is such that when it is irritated by contact under certain conditions, it is contractile and changes shape. It is also changed in its molecular arrangement in the parts that have been subjected to such contacts, and if such contacts are repeated a sufficient number of times and with just the proper amount of force, the new arrangement becomes permanent, and, as it is

expressed, a differentiation has been effected. Such differentiation by any sort of stimulation if of the right force makes the differentiated part more susceptible to the force of that particular sort of stimulation, and allows its irritation to penetrate further and further below the surface. The entire outside surface of all organisms is manifestly exposed to the irritations of contact, and as a consequence in all cases there is a skin of different constitution and consistency from the protoplasm underneath it. We see indeed such differentiation even in inanimate things, a biscuit, a pancake, an iron casting, a lump of putty after it has stood a while, etc. The entire skin of man has become susceptible to irritation by contact with resisting bodies in pressure and touch, and by contact with ether in heat. But some parts of the skin are more exposed to these stimulations than others, and the differentiation and development of the touch sense has gone much further in them.

The part most sensitive to touch is the tip of the tongue. Next is the inner face of the middle finger, then the lips, the tip of the nose, edge and top of the tongue, cheek, big toe, back of the hand, etc., in the order named. The least sensitive parts are the middle of the back, arm and thigh. Thus the graduation of the sense corresponds with the degree of exposure to the stimulation. The skin is composed of two principal layers, the outer one called the epidermis, and the under one the corium or dermis. The top side of the dermis next to the epidermis, is covered with little protuberances in each of which there is a nerve fibre,

a delicate vein and an artery. They are called "tactile papillae" and it is in them that the irritations made on the skin are turned into nerve currents. They are about 1-100 of an inch high, and 1-250 of an inch in diameter. They are most numerous in the most sensitive portions of the skin. In those parts most active in touch such as the tip of the tongue, the ends of the fingers, hand, etc., some of the tactile papillae have undergone still further modification, the nerve being enlarged into an oval swelling thereby increasing its sensibility. These are called tactile corpuscles. The skin itself must be to some extent a vehicle of nervous energy like a nerve. It is possible to make an irritation on the back, without touching any of the tactile papillae yet the irritation will be felt no matter where it is made. So the skin must convey its effects from the point irritated to the nearest nerve.

Sight.

The essential part of the organ of sight is the retina, a skin or membrane that lines a part of the rear side of the eye. It is in thickness from 1-160 to 1-80 of an inch and it is subdivided into 10 layers of different thicknesses, two or three being very fine membranes. The outside layer—the one furthest from the front of the eye is a black pigment layer. Next to it is the layer of rods and cones. This is the important layer, these rods and cones being the essential organs of light and color. This layer is about $\frac{1}{4}$ of the whole thick-

ness of the retina, the front side of it being bounded by a fine membrane. The rods reach from the membrane to the pigment layer and the cones standing amongst the rods with their bases on the front membrane are about two-thirds as long as the rods. Thus they point away from the light. In front of the retina is the large cavity of the eye filled with the vitreous humor. This is bounded in front by the transparent lens. In front of that is another cavity filled with the aqueous humor, which is kept in by the outside coat of the eye, this part of which is transparent, and is called the cornea, while the rest of it surrounding the back and sides of the eye is called the sclerotic coat.

The light after passing through the aqueous humor, the lens and the vitreous humor, strikes the retina, and passes on through several layers of cells, nerve fibres and blood vessels, till it reaches the one containing the rods and cones. These organs are connected with fibres of the optic nerve, and when they are shaken by the impact of the undulating ether, their motion is converted into a nerve current running into the brain and giving the senses of color, and light, the cones giving the former, and the rods the latter. Directly opposite the pupil or front opening of the eye and in the center of the retina where the light is strongest, is a round spot called the yellow spot. In this there are no rods but only cones to the number of about 1,200,000. Outside of this spot the rods mingle with the cones, increasing outward while the cones diminish, till at the edge of vision the rods are three times as numerous as the

cones. Acuteness of the perception of color is in proportion also to the tallness of the cones, they being tallest where they are the most numerous.

Not far from the yellow spot or place of greatest vision is the blind spot where nothing at all can be seen. This is the place where the optic nerve enters the eye. As soon as it gets fairly inside, its fibres spread themselves through the inner layers of the retina, but in the nerve itself is no power of sight, so that when the reflection of an object lights on this spot, it cannot be seen.

Hearing.

Our hearing organ is the most intricate and complicated sense organ we have.

The ear consists of three parts; the external opening, the middle ear and the internal ear.

The external opening is about an inch long and is terminated at the inner end by a membrane called the drum-head or tympanic membrane.

The middle ear is a small cavity bounded on the outside by the drum-head and on the inside by the inner ear. It has an opening called the Eustachian tube, about an inch and a half long, leading down into the pharynx, at the back part of the mouth. Reaching across the cavity of the middle ear from the drum-head to the inner ear is a series of four little bones called the hammer and the anvil, the orbicular bone and the stirrup. The hammer is attached to the drum head and the stirrup rests against another membrane which forms part of the wall of the inner ear. This bit

of membrane is oval and is called the oval window. It is covered by the foot of the stirrup and is shaken when the stirrup is shaken. The inner ear is a very complicated cavity surrounded by bone except on the side next to the middle ear or drum. In this side is this oval membrane, and another hole called the round window, also permanently closed by a flexible membrane.

Inside the middle ear are two membranous sacs which are, however, connected together, making practically one. In shape they correspond with the complicated shape of the cavity, but do not quite fill it, the space outside of them being filled by a fluid called perilymph, while they themselves are filled by a fluid called endolymph. When a noise by jarring the air jars the drum of the ear, the hammer bone is shaken, this jars the anvil, this shakes the orbicular bone and this passes the jar to the stirrup, which, by shaking the oval window jars the perilymph. The round window acts as a safety valve, bulging out whenever the oval window is driven in and swinging back when the stirrup does. When the perilymph is jarred, it communicates the jar to the endolymph in the two sacs. In these two sacs, bathed in this endolymph, are the organs of hearing connected with fibres of the auditory nerve which lead into the brain. The upper of these two sacs is called the utricle, and the lower one the sacculus. The utricle at its upper end opens into three bent re-entering tubes called the semicircular canals; by five openings two of the tubes fusing at one end before connecting with the body of the utricle. These tubes at their entrances are swollen into am-

pullæ so called, or bottles and in these are situated one set of the hearing organs. There is a little ridge in the bottle, composed of cells and nerve fibres, from which grow a lot of stiff hairs projecting into the endolymph. This ridge is called the *crista acustica*, or acoustic crest. When the hairs are shaken they communicate a motion to the cells which motion becomes thereupon a nerve current and passes into the brain.

The *sacculus* is at the opposite end of the ear cavity from the *utricle*, and it takes a coiled shape like a snail shell. It makes two and a half turns around a stem called the *modiolus*. Accompanying it, one above and the other below, are two spaces filled with *perilymph*, connected with the rest of the *perilymph* of the ear. These three parallel winding tubes are called *scala* or stairways—the one above being the *scala vestibuli* and the one below the *scala tympani*, while the middle one, the continuation of the *sacculus* is the *scala media*—the whole three constituting the *cochlea*.

The top and bottom sides of the *scala media* are composed of membranes which are vibrated by all the motions of the *perilymph* outside of them in the other *scala* and so communicate vibrations to the endolymph in the *scala media*. Situated on the bottom membrane of the *scala media* side by side in a series extending from bottom to top of the winding *scala* and numbering about 4,000 are the organs called the *arches of Corti*. One leg of each arch is near the *modiolus*, and the other is about the middle of the floor of the membrane.

The floor widens as it goes up and the span of the arches widens correspondingly being twice as wide at the top as at the bottom. Each arch is connected by a nerve fiber with a branch of the auditory nerve that runs up the middle of the Cochlea and passes into the brain.

These arches of corti are the organs of pitch and tone, each one probably giving the sensation of a tone of different pitch, the whole arrangement being very like the key board of a piano.

Smell.

In the course of the development of the mammal embryo (including man) the cavities of mouth and nose are formed by invagination, that is a pushing in of the skin from the outside, as if it were punched in with a blunt stick. These cavities are thus lined with a continuation of the outside skin, which is called epithelium. A part of this epithelium covering certain portions of the nose cavities is called the Schneiderian or pituitary membrane, and to it are distributed the fine ends of the olfactory nerve which come down from the olfactory lobe of the brain through holes in the base of the skull.

The organs of smell consist of peculiar cells situated in the pituitary membrane and connected with the fibers of the olfactory nerve. A body in order to affect our organs of smell must be more or less volatile, casting off into the air minute portions of its substance which thus come into contact with the cells of the pituitary membrane.

The particles are dissolved by the mucous fluid

secreted by the membrane and the chemical action set up generates the nerve current running up to the brain. The sensation is intensified and renewed when it becomes faint, by sniffing, which dashes the odorous particles upon the membrane with greater force. Smell is the most delicate of the senses and we can smell objects that we can neither taste, touch or see, and that cannot even be recognized by spectrum analysis.

Taste.

The chief organ of taste is the tongue, but the soft palate of the mouth and the jaws are also endowed with the sense to a small degree. The final organs of this sense are papillæ of three or four different kinds on different parts of the tongue. Near the rear end of the tongue are several large papillæ, usually eight, arranged in two rows of four each beginning on the center line and running diagonally outward and forward. These are called fossulate papillæ, because each one is surrounded by a ditch or circular cleft. The sides of this ditch are lined with little organs called taste buds. Scattered about the top and edges of the tongue are a second sort of taste-organs, called fungiform papillæ. They are like mushrooms, consisting of little heads set on short stems.

These two varieties of papillæ, are the principal organs. But there are great numbers of another called filiform, which subdivide into conical and cylindrical papillæ.

Some of these possess filaments on top that appear to act like cilia, or short waving hairs, in moving the mucous of the tongue, and the particles that are to be tasted. Others are organs of touch.

An article to be tasted must be soluble by the saliva and mucous of the mouth. It involves a chemical process, which creates the nerve current running into the brain. This sense is very delicate with some people. Sometimes a quantity of a substance can be tasted, that could not be discovered by any chemical test.

The Muscular Sense

This is not to be confounded with the sense of touch. It is the sense of muscle strain, by lifting weights, pulling, etc.

The organs of the sense, are the muscles themselves. The muscles also possess a sense of rest or freshness, and a sense of fatigue. These are called subjective, as originating with the subject or individual, and not in the external world. But really every stimulation originating in the body outside of the brain or feeling organ, is objective to it.

But the muscular sense of weight is not liable to this reflection, for it is stimulated by forces in the environment, viz., the things to be lifted which use the muscles, to convey to our feelings a knowledge of themselves. This sense like all the rest, is very educable and many who practice lifting and weighing, acquire considerable delicacy in it.

Thus the senses are so many gate-ways leading from the environment to our psychic substance. They are entrances, which the energies of the environment have opened for themselves. The energies of nature are astonishingly enterprising and active. They are constantly attacking every object in the universe, and they succeed in making their impressions nowhere better, than upon the plastic protoplasm of which organisms are made. But the protoplasm itself is of their construction, and the evolution of man and all other organisms from it, is their handiwork.

One set of bodies have forced their entrance into the sides of our heads and din their presence through our ear drums, another have opened windows in front and filled our bodies with light. Others have pulverized themselves to atoms and got themselves wafted against the membranes of the nasal cavities and so let us know the stuff they are composed of. Others have conveyed themselves or rather made us convey them through the front door to settle their respective merits by the sense of taste; while still others more aggressive and truculent than any of the rest, hang themselves upon our muscles or rub, crowd, press and jostle us without limit. If we could suspect these outside forces to have a purpose, we should say they had entered into a conspiracy among themselves. For all their demonstrations have a common end, and that is to transmit to our psychic substance impressions of themselves. Everything they do to any one of our sense organs has the effect to turn a part of the energy with

which they assail the organ, into a current of nerve energy, called the afferent or bringing current, which striking into the psyche arouses in that organ a sensation and intelligence of the outside body that started it. They are in a conspiracy to compel us to have feelings, at any rate that is the constant effect of all their operations.

Not only do the forces in our environment operate the organs as now built, but it is easy to show that these forces built up the organs in the first place and are still at work on them, modifying and moulding them into better adaptations.

Take the evolution of the eye for example. It was developed from the already sensitized skin, in the corners of the head most exposed to the action of the light. The constant beating of the waves of the ether on these spots rendered them more and more sensitive to these stimulations.

Of course this development began with the very simplest animals with the very simplest eyes—mere sensitive spots and reached their culmination in the highest birds and mammals.

Comparative anatomy shows how all the sense organs began in the same rudimentary way in the simplest of creatures, and became more elaborated and perfect the more they were compelled to action by the long continued conditions of their environments.

The development of feeling properties in our psychic apparatus has kept pace with the perfecting of the sense organs.

CHAPTER IV.

Reality of the External World.

The ultimate fact of our existence, the fundamental basis upon which all knowledge rests, is our feeling or "States of Consciousness" as called by the philosophers. Whatever state of consciousness or feeling we **think** we have, we have. But, they say, if we think this state of consciousness relates to, depends on or grows out of any supposed external world, or any supposed conditions or activities connected with such external world, we have no personal testimony, and no positive proof of any sort: that is, it may, but there is no direct or axiomatic relationship, one that does not itself require proof.

But a "state of consciousness" is nothing but the condition produced in our sensorium by a sensation. Suppose a baby's first collision with the milk bottle—it gets a sensation simply of resistance or opposition. If the baby were a scientist, it might be able to detect and become conscious of three or four other states of consciousness arising from the one cause of sensation, viz.: hardness, smoothness, whiteness, shape, distance. After an experience of some weeks the baby does become a scientist and begins to perceive that these conditions are all focused upon one spot—a movable spot which, when it moves takes all its conditions and qualities with it and thus becomes a complete unit or object of itself. But in this

advance from a plain state of consciousness, we have got into another mental state called perception. Perception I define to be the mutual interactions of two or more sensations. That is, sensations do not merely lead to perceptions, but compounded together they are perceptions, just as a single sensation is a sensation. They are of the same quality as sensations, only larger and more comprehensive, having sensations for their composition. I hold sensations and perceptions both to be motions of the material psychic substance, but themselves to be neither substance nor matter. But as we shall see, they are the functions of certain specialized material, much as chemical affinities are functions of bodies. A perception then, being an automatic assembling of sensations, it repeats them in itself and in the test of its accuracy, the appeal of last resort must fall upon the sensations for original verification, which can be had as long as the object and the sense organs are intact. The process of forming perceptions from the sensations begins at an early period in animal and human life.

It is often true in law that circumstantial evidence is better than direct personal testimony. Circumstances not only bear witness to facts, but they are themselves facts, part of the *res gestae*. They cannot lie—witnesses can. When we know all the circumstances of a case we know the whole truth about it. Even if we cannot get all the circumstances we can get a part, and while our knowledge will be incomplete and partial, it will be true as far as it goes.

Our knowledge of the external world is circumstantial. We have feelings and they are subject to change. They are primarily of six different sorts, corresponding with our six senses. It frequently happens that two or more of different sorts occur simultaneously, and so after some repetitions, become connected in our consciousness as belonging together. We do not know at the very first of course, that they relate to the same thing for we at first know nothing of things. Our consciousness consists merely of an aggregation of phenomena or appearances but when they occur in pairs or triplets, they begin to have a meaning and to refer to something behind them. At first everything seen gives the sensation of the thing as being in contact with the eyes. This is corrected by the sense of touch which locates the object definitely if it is within reach or indefinitely distant, if beyond reach. The idea of the distance of an object, depends on the relative sizes of the image it makes upon our retina. Thus a man at 10 steps distance is to us twice as tall as when he is 20 steps off, and only after many observations does the conviction that he does not really change in size, correct the report of the senses, and gradually transform the sense of the difference of size, into a sense of difference of distance. Sight always gives a correct idea of the direction from us of objects, and sound very early does the same. A small infant will turn its head to follow a moving object or a sound. The conviction or perception comes early to infants, of things outside of themselves, and not merely outside of their bodies but

outside of their consciousness, for they will look upon their own parts as extraneous objects. Even the relationship of external objects to each other, begins to be recognized very early in life. "In the ninth week B's baby associated the bib with the bottle and stopped crying when the bib was put on, and at the tenth week put the bottle to her mouth herself."

Our knowledge then of an external world comes altogether from the external world itself as pressed upon us through the medium of our senses. It is necessarily limited as their powers are. We readily perceive the difference between appearance and reality. An appearance is commonly caused by an abnormal impression upon one's sensorium by a subjective cause, or a cause originating inside of oneself. Thus, an overloaded stomach will produce nightmare, and dreams of falling or flying or fighting. When the subject awakes he perceives that he has been imposed upon by a fiction. So a man who has lost a limb by amputation, has a sensation of it as still present. A man may see stars, produced by a blow on the optic nerve. The test of the reality of the things that appear to us is by means of a repetition of the appearance and a further trial of the old, and the addition of new sensations. A ghost will always vanish, if approached or spoken to. Those things are real that bear being looked at a second time and handled and emit sounds when struck.

Some of the metaphysical doctors contend that these things are not real but only appearances or

phenomena; that the real things are over, beyond, out of sight and out of reach. The rocks, the earth, the water, air, gas; the electricity, the light, the heat, the sun and stars—all these things according to some of these systems of philosophy are phenomena and only the symbols of reality. There are indeed appearances and phenomena. We know them by contrast with things that are real. And by the same contrast we learn the reality of the things that we call real.

Every sense gives its own report of the outside world each one supplementing the others and supporting and supplying something omitted by them. But no sense properly interpreted contradicts another. Now as every sense is limited in the amount and kind of knowledge of the environment it impresses upon us, it must be that the knowledge conveyed by all put together is still partial and incomplete. We are in fact so constituted, that we are incompetent to take in and accomodate all possible knowledge, even if we possessed senses enough to convey it all to us.

It may nevertheless be true as far as it goes. It **must** be true to a certain extent, because we every day take our lives in our hands in actions and conduct based upon such knowledge as we possess, and the event justifies our confidence in its substantial correctness. If our knowledge were not correct in any particular, we could not continue to exist for 24 hours. And the same is true of the lower animals, none of whom possess any such amount of knowledge as men do. Yet,

even their knowledge, though superficial, is practically true as far as it goes, and justifies their reliance upon it, in the conduct of their lives. They undoubtedly believe in the reality of things. No better proof of the general accuracy of the reports of the outside world that our senses gives us can be imagined, than the fact that depending on them, we continue to exist.

Another proof that our belief in an external world is not a work of mere imagination, is that our knowledge is confined to these impressions made upon us by means of our senses. We do not think we know anything about it learned in any other way. If we think we in any case have caught the senses in giving a wrong report we do not throw them overboard and appeal to metaphysics but cross-examine them again. And the testimonials furnished by the several senses are in the final analysis not only confirmatory of each other but they are uniformly consistent with themselves. This could not happen if our beliefs were founded upon imagination.

We have no actual knowledge of anything outside of the reach of our senses, and when we allow the imagination to furnish us with ideas we are still able to distinguish between fact and fancy, and in the last appeal to pick out the axioms of which every real truth is composed; an axiom being a final elementary truth that can be distinguished by the senses alone.

Knowledge then consists of the motion caused in our sensorium or psychic substance by the impact upon it of energy in different forms reflected, radi-

ated or projected from objects in our environment. And the environment of an individual may be said to be the aggregation of those objects from which he receives these impacts. Thus the environment of a merchant consists chiefly of his shop and his customers. The environment of an astronomer consists mostly of the solar system, the constellations, the comets, Arcturus and the Dog Star. Many things that are close by us, are as if they were in the moon or Jupiter, and are no part of our environment. There are all about us millions of objects in all conceivable relationships to each other that never assail us with radiations or reflections of light or heat or sound or affect our senses of touch or taste. They are not of our environment and we remain in profound and perpetual ignorance of them, and it is obvious that since the capacity of each individual is limited, it never will be possible for anyone to be in relationship with all external things or to attain to all possible knowledge. Even the capacity of the entire race supposing, knowledge be distributed by a sort of division-of-labor arrangement as it already tends to be, would prove too small to contain it all.

Knowledge therefore like food is to be partaken of by each one according to his wants or needs so far as he can find out what those needs are.

The reality of the external material world also presupposes its continuance or indestructibility. Efforts made to destroy portions of the material of the world have always proved unsuccessful. A stick of wood may be burned and mostly dis-

appear; or the gas meter show a total disappearance of gas, but science shows that the elements in both cases are still in existence, and have merely changed their associations and combinations. It was formerly a common opinion that bodies could be created from nothing and could be annihilated and reduced to nothing. Nobody thinks that way now. It is contrary to every mechanical instinct we possess, and the common sense derived from the most mature experience.

CHAPTER V



Sound.

We know nothing of bodies outside of ourselves, nor inside either for that matter, except by means of motion. Either the body must move to us or we to it or it must project or reflect to us some sort of motion. Incidentally, some of the motions that terminate in communicating knowledge to us have already been mentioned. Thus we get a knowledge of odorous bodies when they cast off particles of themselves into the air. And the way we get knowledge by contacts, by lifting, pushing and rubbing is obvious enough. But in seeing and hearing things, although it appears as if we were doing something, in reality it is the bodies we see and hear that do it all, and what they do is to send motions to us across space that give us knowledge of them we could not acquire

by actual contact. We will now inquire into the nature of these motions.

When any body is susceptible to a molecular or vibratory motion, the kind and character of its motion depends upon its physical structure. A bell for example always gives the same sound whether it is struck by a metal clapper, a cork, a piece of wood, chunk of mud, or a snow ball. The sound will be gentle or loud according to the force of the blow. but it will always be in the same pitch. The principle of this is that the structure of the bell is such that when it is agitated it makes a certain number of vibrations per second. Sound is not in a sonorous body, but is a sensation of our own, the movement of an organ of our psyche. The sonorous body has vibratory motion and this motion after striking upon our ear drum and moving the bones, the lymph and the ends of the auditory nerves, is converted in part into a nerve current, which agitating our psychic substance, gives it the motion we name, the feeling, Sound. The vibratory motion of the bell being always of the same rapidity, it always gives us the same feeling when we hear it. A larger bell vibrates slower and the feeling it gives us is the sensation of sound of lower pitch, but always the same for the same bell. Almost every body is more or less sonorous, and the sound it gives on being made to vibrate is always the same. This note or tone is called the fundamental tone of such body or instrument. In wind instruments the body that vibrates is the air that is contained in the instrument and its pitch depends on the size

of the body of air that pulsates other things being equal. Thus the quantity of air vibrated in a flute is made longer or shorter by fingering the holes. Sounds made by different instruments, when of the same pitch all have the same number of vibrations or pulsations per second. Sounds that we can hear vary in rapidity of pulsations from 33 to about 4,000 per second. And that means that to hear a sound, our ear drum must receive the impact of some number of pulsations between those two. To hear the C at the beginning of the third octave, we must experience 132 pulsations, etc. Now these pulsations pass through the bones, jar the fenestra ovalis, which shakes the endolymph in the vestibular sac in which are located the ends of one branch of the auditory nerve, and also shakes the endolymph in the scala media of the cochlea, and communicates vibrations to the arches of Corti. Each of these wonderful little instruments is connected with a fiber of the cochlear branch of the auditory nerve. They are seated side by side on a membrane—like the strings of a piano, regularly increasing in length from bottom to top, and each one is competent to be moved only by pulsations of the same pitch as its fundamental. When a pulsation from a sounding body reaches our ear, it jars the particular arch of Corti that has the same fundamental pitch as the sounding body from which it started. Each pulse of the endolymph against the arch of Corti exhausts itself in generating a wave of nerve energy, which passes up the auditory nerve to the sensory area for hearing, on

the side of the brain a little below the middle on the superior temporo sphenoidal convolution; not far from the ear. Now if in a given case there are 132 successive pulses in a second, that number of waves of the electro-nervous energy will pass up the nerve and dash upon the sensory psychic organ, which receiving that number of waves of stimulation feels the sound we call C of the 3d octave, that is, the force of these waves ending as waves become the new motion called feeling. If the waves number 176 per second, we feel the sound called F of the 3rd octave, 297 waves or pulses give the feeling of D in the 4th octave and so on.

Almost everyone must have observed that when sounds are made near a piano some of the strings are apt to be thrown into a soft vibration giving their own note of course. In such cases, the strings that vibrate are those of the same fundamental as the sounds that set them going, and the explanation is, that the vibrations that cause the first sounds are communicated to the air which is thrown into pulses of the same pitch, which pulses impinging on the strings by their repeated cumulative action in the same time start the swing of the strings. None of the strings can be moved by pulsations of the air unless such pulsations are of the same rate as the fundamental of the string. A number of sounds in different pitch may be made at the same time near the piano and each one find its corresponding string and set it in vibration.

There can be no doubt that this action is analogous to that which takes place in the ear when a

compound series of sound pulsations are dashed against the keyboard of the arches of corti. All of the several stimulations corresponding to the several sounds dash as vibrations of the endolymph against all the arches, but they move only those whose pitch corresponds with their own.

Each arch that has never been stimulated is connected with a hearing organ of the same pitch in the psyche by a nerve fiber.

The pitch of a musical sound depends upon the number of the vibrations or pulses per second. If two instruments of the same pitch are sounded at the same time, the sounds are in harmony because each instrument gives the same number of pulsations per second to the air. These pulses for both sounds are movements of the same body of air, and since the two pulses are in unison the air will be moved by both alike which expressed in our feeling is harmony. When we speak of the movement as being harmonious, we only mean that the motions are at the same rate per second. The comparison of the two movements must of course be in the psyche, but it must be there only because the two movements are there. The comparison is not made outside and carried in afterwards, but each movement or its representative in feeling must be transferred to and set up in the psyche, and the simultaneous activity of the two feelings produces the blended or compound sensation. A further activity of memory organs and of organs of principles or of the habit, fashion, taste and style in musical culture that may have already been established, will be excited, and the resultant of all this simultaneous ac-

tivity will be a perception of the harmonious nature of the relations between the two sounds and the relations in which this perception stands with reference to the recollections of our standards of taste and cultivation.

If two instruments be sounded at the same time the vibratory or pulse rate of one being double that of the other, the effect will still be harmonious, because while the same body of air is moved, there are two pulsations at every other pulse on top of and reinforcing each other, while those that fall between are uniformly so, and in consequence the blended motion is uniform and rhythmic.

But in case two sonorous bodies having a different rate of vibration are sounded at the same time, the resultant sound will be uneven, that is, it will at once instant be loud, at the next the sound will almost or quite die out, then again loud, then still, and so on. The motion that gives us the sensation of sound is a movement of the air in pulsations alternately away from and towards the sounding body. When for example, a bell in the key of C, the pitch of which is 132 vibrations per second and the wave length eight feet and three inches, is sounded, the air is driven away from the point where the blow is struck in all directions, its elasticity allowing it to be compressed, such compression extending to the boundary of a sphere, the radius of which is a wave length, viz., 8 feet 3 inches. At the surface of this sphere is the limit of the outward movement of the air of the sphere. From there it recoils back toward the center and in doing

so gives an outward pulse to a spherical shell outside of itself, such shell having a thickness equal to a wave length, and a diameter equal to two wave-lengths.

The air of this shell upon receiving the impulse from the inner globe is driven outward in compression upon itself, and giving an impulse to a second shell having a thickness of a wave length, and a diameter of three wave lengths and so on. This outward or condensed pulse as it is called of these spherical shells of air is followed by the recoil of the elastic medium back toward the center. This is called the rarefied pulse.

Now if another bell slightly out of unison with the C bell; one having say 135 vibrations per second, is struck, at the same time, the two will at first reinforce each other and create loudness, but the pulses of the C bell will gradually fall behind those of the other, so that when it is on its 22d outward or condensed pulse it will meet the return or rarefied pulse of the other bell. The two pulses thus antagonize and quench each other producing stillness during one pulse. After this the pulses will approach again and by the time the 44th condensed pulse of the C bell is reached the other bell will be on its 45th condensed pulse, when they reinforce each other, and loudness is created again. They will quench each other again at the 66th and 110th, condensed pulse of the C bell and reinforce at its 88th and 132d. This rising and falling of the sounds is called a beat, and the antagonizing, and mutual destruction of the sounds is

sound interference. Obviously there must be just as much interference in nearly all the pulses in a wave as there is in a wave and its return. Someone has wondered at the same time the disagreement of the pulses and their mutual collisions and number of each wave will be perfectly evident. The number of waves in any given case per second is equal to the difference in the number of the vibrations of the two areas concerned. Thus the number of waves produced by winding C & D of the small machine is $13\frac{1}{2}$.

The loudness of sounds depends on the distance we are from the vibrating body. If we could concentrate in a single point, the entire motion that is originated at the vibrating body, it would be as powerful at the end of the third wave as at the beginning. But it scatters, and is conveyed in all directions, and only a small area of it can affect the drum of a human ear, all the rest going past or going in an opposite direction. The sound that at the end of the first pulse covers a sphere of $8\frac{1}{4}$ feet radius, at the end of the second pulse covers four times as much surface so that it is heard only one-fourth as loud by the same ear. When sound pulses are passed through a tube they are prevented from spreading out and so they are delivered at considerable distances without much loss, as we observe in the use of speaking tubes. Speaking trumpets act on the same principle but not to the same extent.

It is well known that sound is reflected, as in the echo; and when its pulse strikes a surface the angle it makes in leaving it is the same as that is

made in approaching it. According to this fact, when a beam of sound strikes a convex surface in being reflected it is scattered so that it becomes fainter; but if it strikes a concave surface it is converged and made more intense. Auditoriums should be constructed with reference to this fact.

The motion that makes sound, in passing through a body of greater density is retarded, other things being equal, and the greater the distance it traverses in getting through the slower it goes. If the body be wedge shaped the motion goes slower through the thick than the thin part, so that the beam or pencil that may represent the material that moves receives a bend or is refracted on its emergence; toward the thick end of the wedge.

Two wedges placed with their butt-ends together would thus throw two rays of sound together thereby increasing the loudness and this is also, on the same principle, accomplished by sending it through a lens consisting of a bladder filled with Carbonic Acid gas.

In passing through a dense medium as a wall the volume of the sound is reduced or "deadened." The floors of our passenger coaches and sometimes of buildings are constructed with a view to this "deadening." The motion thus stopped or "absorbed" as it is called is of course degraded to the motion called heat.

In wind instruments such as the flute, horn, cornet, trombone, etc., the shape of the cavity in the instrument as well as the material it is made of

have much to do with the quality of the sounds, and the character and number of its harmonics.

In the foregoing we have called the vibrations, pulsations, waves, etc., by the title, sound. But this is not correct. If a deaf man strikes a bell with a hammer, he gets no sound from it. He may feel the bell quiver and see it pulsate, but neither of these is sound. In fact the quiver of the bell may communicate itself to the air and be conveyed to the ear drum of the man without producing a sound. The quiver of the bell is a mode of motion of the bell and the pulse it communicates to the air is likewise a mode of motion of air. Sound is a mode of motion, too, but it is not the motion of bells or air or strings but of an instrument situated inside of the skull, called the **psyche** or that portion of it, in this case, called the acoustic patch. It is the motion of this patch that constitutes sound and it is a sensation of ours, in short a part of what we call our minds. In order to the production of a sound there must be the quiver or jar of the sonorous body, a transferring of its motion to the air whose pulsation then knocks on the ear drum. If the drum is out of order the agitation stops right there. If not, some of the pulsations of the air are halted and turned into a nerve current which runs up to the acoustic patch the agitation of which constitutes the sensation of sound. So there is no such thing as sound without a hearing apparatus—only jars and shakes and quivers.

Nevertheless for convenience we do give the same sounds to these jars in the environment

when they produce sounds in our auditory apparatus.

The same reflection may be made with regard to other senses. If a girl plucks a rose the odor of the same is not the motion of the rose but of her psychic substance, and likewise when she pricks her finger, the pain will be in her brain and not the thorn.

The most important part of the lesson to be learned from this study of sound as a mechanical motion is its transfer to our brain to become feeling; through these consecutive mechanical objects, the bell, the air, the nerve and the brain cells all alike mechanical and each term giving up to the one before, the equivalent of the energy it received from the one behind.

The strictly mechanical nature of the operations and appliances by which the brain is agitated and set in motion for the production of sensibility, hearing for example, is an ample demonstration of the strictly physical nature of the psychic apparatus and of the sensibility it creates.

CHAPTER VI

Radiant Energy.

We must now consider the other ties by which we are connected with the external world.

Here are six sense organs all parts of our bodies. They are of different forms and consti-

tutions. Outside of ourselves are vast numbers of bodies and objects in motion hurled about in all directions, some coarse and heavy, and some so fine and apparently delicate as to be totally invisible and impalpable, yet vastly powerful and infinitely important. When dashed about as above, these bodies come more or less into contact with our sense organs. They go by the name of forces or energies; or when striking our sense organs they are called stimulations because their violence upon the external sense organs creates sensation and feeling in our internal organs of sense.

The sort of force that plays upon our eyes and creates in us the sense of light and color is the violent shaking of a substance called ether which it is proved is a web-like material pervading all space and the spaces between the molecules of all bodies. The chief source of the energy that shakes this vast expanse of ether is the sun. Any body that can burn with a flame can stimulate the retina of the eye. When such stimulation takes place it is instantly followed by a nerve current from the sense organ into the brain, somewhere in which, a sensation of seeing is felt. The force of sunlight may seem to be an inconsiderable force but it is the cause of the change from winter's ice to summer's vegetation and the greatest promoter of chemic change known to us. In taste and smell the bodies to become acquainted with us place themselves directly upon our sense organs and by their chemical action convert a part of the energy of the collision into a nerve current that

flows to the brain and sets up the respective sensations. The sensation of hearing as already shown is produced by the mechanical pulsation of the air, ether or other fluid in comparatively long and heavy pulses which striking the apparatus of the auditory nerve is there turned into a current up that nerve running into the part of the brain that receives the sensations of hearing. Thus a part of the energy with which each one of these outside forces assail us is dropped at the sense organ that forms the entrance to our psychic substance, and there turned into a nerve current. Doubtless a small portion of the energy is always lost as work. But we must not forget that the forces we are talking about are real working material energies, forces begotten by material bodies in motion by transfer from other bodies previously in motion, but now partly or wholly at rest.

It makes no difference what agitation or stimulation strikes upon our sense organs from the outside, if it is normal, it produces a nerve current running in hence called an afferent current. This shows that the force is all from the outside and that is true even of that part that appears to be furnished by the food, blood, etc.

Physiologists in experimenting with the brain and nervous systems of men and other animals, commonly use a galvanic battery and coil, because a galvanic current will run along the nerves almost exactly as the natural nerve current does and produce very similar effects.

The process by which we get our feelings of light and color and heat is analogous to that which gives us sound sensations.

Like sound as mentioned above, so light, color and heat are the names of feelings of ours, and do not pertain to any body external to ourselves, although for convenience we do apply these names to those motions of bodies in the environment that give rise to the respective feelings, and speak of a rose as red, a fire as hot, the moon as bright. The cause of our feelings of light and heat is the vibratory or undulatory motion of the ether that fills all space and is set in motion by any body that upon the application of force can be made to oscillate or vibrate with a certain amount of violence and rapidity, as a coal of fire, a friction match, a candle or lamp, the carbons of an electric arc or incandescent light, the sun, a meteor, a star etc., etc. The motions which these bodies give to the ether are undulatory or waving and the waves so formed are of different lengths, and of different degrees of rapidity and it is found that the quality of our feelings depends on the rapidity with which these waves follow each other and beat upon our sensory organs, and this rapidity depends in turn upon the length of the waves. The longer the waves the slower they are and the shorter, the faster. The forces we call heat and light are classed under the general name of Radiant Energy.

Every beam or ray of light or heat consists of a bundle of very much finer threads or pencils all (when agitated) in this state of undulatory movement. The waves advancing along the pencils

from the point of agitation, each pencil consisting of waves of a different length and rate of vibration but moving through space at the same rate per second which rate is proved to be 186,000 miles, for all kinds of light since it takes a little over eight minutes to come from the sun to us a distance of about 93,000,000 miles.

The rate of undulation of waves that give us the sense of extreme cold is inconceivably rapid but they are slow compared with those that give us the sensation of warmth. The slowest that give us that sensation occur about the beginning of the 42d octave and the rapidity of the undulation is about 109 trillions or 109 million of million times per second, the waves being so short that it takes about 9,250 to make an inch. As we ascend the scale of the 42d octave the heat increases, and probably this octave supplies the principal heat necessary for animal and vegetable growth and comfort. By the time the beginning of the 43d octave is reached we find the number of vibrations per second to be 218 trillions, and the wave lengths reduced one half so that it takes 18,500 to make an inch. The undulations that cause the greatest sensation of heat and the highest temperature begin in the upper part of this octave and extend over into the next. At the beginning of the 44th octave the number of undulations per second is about $435\frac{1}{2}$ trillions, and there are 37,000 waves to the inch. The undulations at the beginning of this octave affect us through the sense of sight as well as through sensation of heat. They by impinging upon our

retina create in us the sensation of red. All the undulations in the 44th octave give us color sensations, and those of the lower end of it give the most powerful heat sensations also, but as we ascend the scale, the heat sensations become fainter and fail in the upper end entirely. The color sensations of the 44th octave are the well known seven primary colors shown in the rainbow and the solar spectrum; red, orange, yellow, green, blue, indigo, and violet. The sensation given by the combination of all these colors is the white light of the sun. The length of the waves that give the sensation of violet is only half that of the red rays being only one seventy four thousandth of an inch long, while their rapidity of vibration is double, being 871 trillions per second. The rates of vibration and wave lengths that give us the sensations of the other colors are between these, the waves diminishing in length as we ascend the scale from red to violet. In middle yellow for example the waves are one forty six thousandth of an inch long and the rate of vibration is 543 trillions to the second. In middle blue there are 53,500 waves per inch, rate 630 trillions, etc.

There is at least one octave of these ethereal undulations above the one that gives us color sensations, viz.: the 45th. The undulations of the 45th octave have great chemical power. Their force is sufficient to decompose the film of nitrate of silver on a photographic plate and thus produce pictures. They also have strong influence upon growing plants and upon animal organisms. The yellow rays in the 44th octave are found to be

the ones most influential in the growth of plants. It is these rays that partly disrupture the carbonic acid gas of the atmosphere, loosening the affinity of the carbon and oxygen for each other, thus making it possible for the chlorophyl organisms in the leaves of plants to seize the carbon atoms and incorporate them in the tissues of the plants. The chemical and mechanical effects of radiant energy which at bottom are really the same thing, are thus seen to be of the utmost importance in the external world. The body concerned in this energy and whose motion the energy consists of is everywhere—literally omnipresent, not merely surrounding and touching all bodies but penetrating and permeating them through and through. The densest and most solid of bodies no less than the gases and liquids are composed of separate molecules or small masses placed together; but in no case so compactly that there are no crevices or interstices between and around them.

The ether interpenetrates all bodies and fills these intermolecular spaces.

Thus the motions which are imparted to it anywhere, are radiated away from the point of origin in all directions in undulations of its own substance. When these undulations reach another body they may continue on into it and through it as the wind blows through a forest, or they may come to an end as undulations and their energy appear in some other form, as electricity nerve current or feeling, or be made latent or potential by performing some form of molecular

work. Thus this substance carries its influence into the very marrow and intestines of all bodies, and does its work not so much upon the body as a mass as upon every atom and molecule of which it is composed. It dwells in the intermolecular spaces and is constantly in intimate contact and relationship with these molecules, so that whatever affects it affects them, and conversely whatever affects them affects it, and as it extends throughout all space and touches all bodies, it brings all bodies into relationship to one another and is the medium of all communication between them and the vehicle for the transfer of energy from one to another whether the distance between them be no more than the width of a molecule, or so great as to equal the diameter of the milky way, or the still more appalling span that separates us from the most remote stellar system in the universe.

Ether is not the originator of any force or energy, but when it receives an impact from any other body it quickly, that is at the rate of 186,000 miles per second through clear space, conveys away the energy of such impact and delivers it to the first body competent to take it. No body in nature, of itself seeks work or motion, but every one, when it receives an impulse tends to rid itself of it at the earliest possible moment, by passing it on to the nearest available body, and then coming to a state of rest. There is no substance in nature so active and rapid in transferring its motion to others as the ether, or apparently, so anxious to come to a state of rest. Yet none

appears to rest so little as it, for it receives as fast as it gives, and so on forever.

[For discussion and numerous examples of the effects and ponderable bodies on ether and its effects on them see Chapters 41, 42, 43, 44. Pp. 387 to 423 Dynamic Theory.]

There is a striking parallel between the motions that constitute or create sound, and those that constitute radiant energy. We have the same phenomena of reflection, as when colors or lights are reflected from a mirror or other body, and the angle of incidence is equal to the angle of reflection as in sound. We have partial absorption when white light is thrown upon what in common language we call a colored body—as a yellow one for example in which the rays of all the primary colors except yellow are absorbed or quenched and the yellow alone reflected. We have total absorption when the light falls upon a black object, absorption meaning the reduction of the high pitch rays that give light to the low ones that give heat. We have also the deadening of light without its decomposition by passing through semi-transparent white mediums.

The intensity of light, greatest at the point of origin, diminishes as sound does, in proportion to the square of the distance from that point, and for the same reason. The diverging rays may, however, be kept together by means of a tubular mirror or speculum, an instrument on the same principle as that of the speaking tube.

Light waves are also retarded in passing from a rare to a dense medium and bent or refracted in

passing into and out of a wedge or prism; converged and intensified by passing through a lens or by being reflected from a concave surface, and scattered when reflected from a convex surface.

The phenomena of pitch and interference are likewise to be met with in light as in sound.

"When two minute pencils of light are admitted through apertures very near to each other the screen on which the blended pencils fall is streaked with lines absolutely dark. This is interference." In passing by corners the ray is diffracted so that one part has to travel further than the other parts. When the difference in the distance amounts to half a wave length the crest of one undulation falls into the hollow of another so that the two antagonizing motions neutralize each other, and at that point there is stillness; which in this case means darkness.

If a lens be placed upon a plain surface and light allowed to pass through the lens, rings of colored light will be formed under the lens alternating with dark rings. In passing through the lens the rays are refracted and those rays nearer the center are more retarded than those outside, which refraction and retardation of a portion of the rays of pencils furnishes the conditions for interference by allowing the crests of some waves to fall into the hollow of others thus producing darkness or rest, in rings at regular intervals from the center.

The character quality and molecular constitution of a body has all to do with the way in which it is affected by or affects light and heat.

Light passes freely through some bodies and not at all through others. Certain kinds of the motion that produces light can pass through certain bodies while other kinds cannot. Some bodies allow light to pass through but no heat and others are just the reverse being filters for heat while they keep the light back. Some bodies will allow some kinds of rays to pass straight through while they refract others. Almost all bodies absorb some kinds of light while they reflect others, this reflected light in common language is the color of the body reflecting it.

Chemists tell us there is great difference in the weights of the atoms of different bodies. The lightest atom is that of hydrogen which is called 1 and becomes the measure of all the rest. The atom of Lithium is 7, Carbon 12, Phosphorus 31, Iron 56, Platinum 197, Gold 196, Silver 108, Bismuth 210, Uranium 240, etc. Notwithstanding the wide range in the actual weights of these atoms, it is proved that it takes just the same quantity of heat to raise any atom one degree in temperature. To understand this it is necessary to bear in mind that heat is a motion of ether. The oscillation or other motion of ponderable bodies is not heat. Heat is developed when such motion ceases in the ponderable body by transfer to the ether. When a body is made hot by radiant energy the process is as follows: the undulations of the ether when they reach the body do not stop at its surface but keep on in, passing into the intermolecular spaces and setting the ether already there into undulatory waves like so many levers prying at

the atoms of the body. Conceive a lever under every atom throughout the body prying at the same time and it is obvious that they will pry the body apart and widen all the intermolecular spaces—a process called expansion by heat. The length of these levers that do this prying varies as said before. Those chiefly engaged belong to the upper part of the 43d and lower part of the 44th octave and are from 1-46,000 to 1-25,000 of an inch long. The atoms they do their work on are much smaller but vary in size in different bodies. Sir Wm. Thompson estimates the size of a molecule of water, which is composed of two atoms of hydrogen and one of oxygen, to be 1-250,000,000, one two hundred and fifty millionth part of an inch in diameter so an average lever is five to ten thousand times as long as a molecule of water and so gets a tremendous purchase on it. This molecule is however, probably smaller than the average, even smaller than the atoms of many elements. But as we know by the results the levers are long enough to pry up the largest atoms. As stated above there is little heating power in the upper end of the 44th octave. Either the waves here are too short to give enough purchase or are not driven with sufficient force—probably the latter.

Now when these levers give the atoms a toss they tend to come to rest themselves for according to the conservation theory they cannot give their motion to another body and still possess it them-

The resting of the levers, that is to say the loss of the ether means to our feelings, cold. The sensation that has succeeded that of the ether

is the dodging back and forth of the atoms to which the ether waves have imparted their motion. As each atom receives its impulse it flies as far as it can, until it collides with some obstruction. From this it rebounds, flying in another direction till stopped and reflected again and so on. At each of these collisions it loses part of its motion, imparting a portion of it to the body it collides with and some to the ether. In this way it gradually loses all its motion of oscillation and comes to rest. The collisions it makes with the ether re-establish its wave motion, which traveling outwards toward us appears to our feelings as heat radiated from such body. The atoms receiving the jostle of one in motion are themselves moved and behave as it does, jostling others and losing their motion in part to them and in part to the ether in the intermolecular spaces. In this way the ether at last gets back from these flying atoms all the motion it gave up to them in the first place, the body which they compose being thus for the time being a radiant body. Of course it never radiates any more motion than it receives. Now to understand the fact above stated that it always consumes the same amount of ether motion (or heat) to raise the temperature of any atom a given number of degrees regardless of the size or weight of the atom, we have to consider first that temperature is the amount of motion the atoms communicate to the ether as they come to rest after having been agitated and made to oscillate. That is, it is the heat they cause the radiation of, and it

is just equal to the amount that caused their oscillation in the first place. Now it makes no difference how much an atom weighs, when it is tossed up it gives out in coming down just as much energy as it took to throw it up. If we apply the same force to two atoms one weighing four times as much as the other, the velocity with which the heavy one starts off will be only half as great. The light one will strike an obstruction with less force but it will strike twice as often, and as just the same energy is used to set them both going, just the same energy appearing as radiant heat or temperature will result as their collisions reduce the rapidity of their oscillations.

There is another phenomenon to be mentioned in this connection, and that is latent heat as it was improperly named by its discoverers. As a body passes from a solid to a liquid form and from a liquid to a gaseous form as many may be made to do, more or less heat disappears, and does not show in the body as increase of temperature. "Thus after ice has been raised in temperature to 32° F. it will require 143° more of heat to raise its molecular structure from that of ice to that of water, for after the 143° heat has been expended on it, it becomes water with a temperature of 32°. If now 180° more heat be expended on it, its temperature will be 212°—at which point the water boils. But still it is water, and now 967 degrees more heat may be expended on it before it becomes steam, and at that moment its temperature is still just 212°. So we know that the work of tearing apart the ice crystals in a pound

of ice is equal to the energy represented by raising a pound of water 143° or 143 lbs. 1° and the work of tearing apart the molecules of water represents the energy required to raise 967 pounds of water one degree."

In other words the prying force of the ether necessary to pry the molecules of the ice far enough apart to make them fluid equals 143° and the prying force necessary for separating the molecules of boiling water far enough to overcome their cohesion and make them a gas, equals 967° . In descending from one of these states to a lower one the same quantity of heat is radiated off. At the risk of appearing tedious I have recited these details in order to impress upon the reader the mechanical nature of this agency—the ether, and of its functions, and to show what an important relationship it holds to us. It does not bring us mind or thought or feeling. It brings us agitations of a nature as mechanical as driving nails. In our own bodies these agitations by running against our nervous structures, excite them and lose to them a part of their force and activity, which in our psychic organs become sensation and feeling.

And these by their further interactions become perception and reason and will. The organization of mind therefore takes place in our psyche. It is not brought to us from the outside, but we owe to the ether in the sunlight and heat; the power necessary to operate on the sense organs and produce the mental effects.

Not only is the ether the agent for bringing

us the necessary force, but it performs an indispensable service in the work inside the soul itself in the equalization and correlation of the various stimulations that constantly enter through every sense

CHAPTER VII

Energy and the Forces.

Among the most important discoveries ever made by science, is that denominated the conservation of matter and motion. This means that matter can not be either created out of nothing nor destroyed, and that likewise the quantity of motion and of the power represented by it always remains the same in its aggregate, no matter how much it is shifted from one body to another.

The terms Energy and Force are commonly used synonymously: but in exact science Energy means "Power for work," and Force is its measure or quantity.

In the nature of things nothing can be made to move without the prior expenditure of motion in another body. This is just a plain mechanical axiom, no energy is created from nothing but if we require motion or motive power, we must find some body in motion or in a position of potential energy, that is in a condition to be let off and communicate its power of motion wherever it is

required. And when we do this and take away its motion, it no longer has it, but has to an equivalent degree gone toward a state of rest. A conception of a force that can always act without expending itself is irrational and absurd. All experience and all philosophy aver that something cannot be got from nothing. It cannot be therefore that an atom is a center of an uncreated force, always fresh and of uniform quantity, always spending but never spent, and requiring no reinforcement or recuperation. It would be as logical to say that the original atom is, likewise of such constitution that it may be borrowed from forever, and supply all demands for material, and never be exhausted or reduced.

No, an atom is not a center of force or energy, any more than any other form of a body, except as work is expended upon it to make it such a center, by putting it on a strain or in a potential position.

Then it is a center of energy temporarily, until such energy is expended, or transferred to some other body.

A body may be destitute of motion—be at rest—that is such a condition is rational logical and possible. Although we cannot in our experience find any such, for every particle of the universe we are acquainted with has been assaulted and had more or less motion hammered into it. A body may be at rest as a mass, but nowhere on earth are the molecules of a body entirely free from heat—which is one of the forms of motion.

The abstract force postulated by the metaphysicians, has no existence whatever, and no reason for being—as we shall see.

In comparing the potentials of forces in separate bodies it is essential that the forces should be of the same name in each, as Heat, or Galvanism, Gravitation, Magnetism; etc.

But each of these has its equivalence in every other, and each is transformable directly or indirectly into any other.

Gravity cannot have its origin and dependence in any sort of perpetual indestructible unchangeable force, but it is to be classed with the others as one of the forms of energy like magnetism, heat, light and electricity. None of these forces or any forces reside perpetually in any particular piece of matter. They come and go as they are made to, and a body is not a center of force except as force is put into it from the outside by work.

It might be contended that the chemical bonds or affinities of the atoms of the elementary bodies, constitute them centers of force. It is pointed out that an atom of one sort has its affinity and attraction for an atom of another sort, and these affinities which amount to the same as forces are constant and ineradicable. They disappear when they are saturated by their union with each other, but if a compound is dissolved the component atoms will be released and every one will be endowed with their affinities, the same as when they were free before. The bonds of atoms are no doubt points of force or

rather of strain, a condition of potential energy, and every atom is endowed with from one to eight of them. But they are definite and limited. They have just so much force, and when that is expended they are unable to form any additional unions.

If after a union is effected between two bodies, a third one comes along for which one of the paired bodies has a greater affinity than for its mate, it has not the force to hold on to both, but must first let go of No. 1 before it has sufficient energy to form the new union.

They are like a wound up spring before they find their affinities but their force is all or mostly consumed in acquiring the new forms that follow their unwinding. At most, the affinities are of comparatively small energy.

The indications are that the affinities are strains or twists imposed on simpler elements, by the action of their environments under extraordinary conditions.

The elements some 74 in number as listed by the chemist are not the final units of matter. They merely show such conditions of matter as are possible within the narrow limits of temperature and violence within which it is possible for the chemist to carry on his investigations. There are numerous indications that the affinities are subject to modification by changed conditions. For example Boron exists in two states. "In one it is a fine amorphous greenish powder and easily takes fire. A hot summer sun will touch it off. The other sort crystallizes like diamonds

and is nearly as hard, is transparent and sometimes colorless. It is difficult to burn this variety even in oxygen gas."

There are numerous other facts like this in Allotropism and Isomerism and in Spectroscopy that prove the affinities and forms of atoms to be more or less unstable under violent treatment, and we have a right to infer that in the tremendous collisions, catastrophes and disintegrations to which matter has been subjected, there have been reconstructions and re-adjustments, the conditions for which are as yet a million times beyond the resources of the chemist either to imitate or to undo.

Mr. Spencer asks, (in First Principles p. 57) when you set a body in motion by colliding with it, what have you given it?

I answer we have given it motion or energy or power for work, or as is it often said we give it force. But the term Energy is the best to express the fact of the transfer of something, and the term force is then used for the measure of the energy transferred as it may be expressed in terms of weight or motion. For example, an empty car of a weight of 40,000 lbs. stands motionless alone on a track in the Milwaukee freight yard. A switch engine is near by, also a yard-brakeman. The Brakeman signals the engine to hook on to the car, then turning a switch he calls the order; "give her a kick." The engine pushes the car rapidly for 150 feet, when the Brakeman who is on the pilot draws the coupling pin, the engine stops, and the car goes

on 150 feet further—far enough past the switch to give clearance on each side, and stops from the friction of the wheels against the rails. It would require 12 men 5 minutes to move that car by hand, at an expense of 50 cents. Now the engine gave the car 50 cents worth of work. This energy was derived from the burning of a scoop of coal worth 4 cents. If the work had been done by man power, the energy obtained would have been derived from the burning of food in their stomachs. This kind of fuel is more costly than coal. Where was the energy before it was in the shape of coal? It was timber, that was caused to grow by the energy of sunlight some millions of years ago.

If asked whence the energy of the sunlight came, we could only tender the conjecture that it came from the wreck of a solar system before this and the collision of cold worlds. What became of that part of the energy consumed in moving the car? It was scattered along the route, dissipated as heat, radiated from the rails which were made warmer by the friction of the wheels against the rails. In this example it is clear that the car, being at rest was destitute of force (except cohesive force so-called that holds the materials of the car from dissolving, mentioned above) until it got the kick from the engine. It is true the car had some heat and there was light reflected from it. These do not cut any figure in the energy, transferred from the engine to the car, and so may be ignored. The engine lost the amount of energy due to the consumption of 20 pounds coal,

the car gained that amount in one dose in the form of motion and under its impulse started off at the rate of 10 miles per hour. At the end of 50 feet the car was going perceptibly slower and had expended a part of its energy. At the end of 100 feet it had lost still more and was going still slower; at the end of 150 feet, energy and motion all gone and the car stopped.

Let us take another example.

A farmer goes to town with some of his garden products. He has one horse and a light wagon. We will call the horse a center of energy because he has been made such. First the farmer has "raised him from a colt." He has given him quantities of carbonaceous and nitrogenous food and seen him grow in weight one or two pounds daily. The horse has been "broke" so that his psyche through habit has been drilled like his legs to deliver his energy without unnecessary loss. The horse was specially fed last night to increase his force for today's job. The horse is pretty much what the farmer made him. A whole lot of the energy accumulated in the man as his own capital stock of a center of energy has been transferred to the horse all along during the life of the horse. All ready! The man hits the horse a tap with his whip. This costs the man a small amount of his energy. The mental effort in forming a will also costs energy derived from his food and stored in his muscles. Likewise the horse loses something, but he starts off on a trot and begins to lose his energy quite rapidly

and uniformly. He loses heat from the warmth of the increased circulation of the blood. This heat is diffused through the air raising its temperature. It loses in direct force by the tiring of its muscles from the consumption of the electric and nervous storage therein.

It loses also in the manufacture and exhalation of carbonic acid gas. Every time the horse breathes (or the man either), he draws air into his lungs. Here the oxygen of the air meets carbon, which in the shape of oats, grass, etc., has formed the food of the horse, and the mixture of these two, a heavy gas, is diffused through the air and swept against the leaves of growing plants and passes into their sap the carbon, becoming assimilated as the food of the plants—oats, grass, etc., while the oxygen is rejected back into the atmosphere for horses, men, etc., to breathe over again. The horse loses also in the excretions dropped along the road which washed by the rains are carried into the river and at length reaching the sea are lost forever to human use.

By the time this horse gets home, while he will still be a center of energy, he will himself recognize by a certain tired and hungry feeling that he has descended from a position of high potential to one comparatively low. It is this feeling—a feeling of uneasiness mark you, that impels the horse to lift up his voice and give utterance to a whinny, which being interpreted means, "oats!" This voice scurrying along the auditory apparatus of the man, arouses

in his psyche a feeling sufficiently uneasy to require compliance with the demand of the horse.

Thus beginning with feeling in the horse a psychic phenomenon, we have the whinny, a purely physical phenomenon, followed by a feeling in the man; another psychic phenomenon, and the incident closed, and the two feelings obliterated, by 5 quarts of oats—purely mechanical.

These mental activities may be reckoned as part of the assets in estimating the value of the energy in question. In fact the man's mind measured from the beginning is half at least of the whole—all parts alike physical, everybody is a center of energy according to the amount of energy expended in making him such.

Atoms are also 'same as above, **small** centers—small force. You cannot subdivide the atoms without subdividing the capacity for work—you may charge an atom with galvanism but its capacity will allow it to hold but little, when you divide matter till none is left, neither is any force left. The transfer of work-a-day energy is a purely mechanical process—nothing mystical or transcendental. Drive a horse hard all night and in the morning he is a center of reduced energy—feed, water, curry and rest him, and his energy will be increased. The energy of one center may be derived from many.

Definite bodies of matter may be either at rest or in motion. A body at rest has no energy unless it happens to have a position of energy, like a big boulder high upon a hill side, while it was probably placed in glacial times. In the course of time,

the rains will undermine it and it will roll down giving off as much force as it would take to hoist it back again.

There is no warehouse, magazine or armory for storage of Energy away from **matter**, and no supernatural supply. Any piece of matter—any center of energy is like a brook, sometimes it is nearly dry—then come some light rains and make it a little stream—then a deluge and it overflows its **banks**.

A stout man has capacity for storage of large energy accumulated by plenty of food and other sources of virility, but when he gets sick it all becomes dissipated to other bodies—losing **heat** in fever, etc.

Such examples as that of the freight car and the farmer's horse could be multiplied almost to infinity. Consider a deciduous tree. In the fall, shorn of its leaves, its sap dries up, it looks a forlorn object and anything but a center of force. It is; however. Burned under a boiler it makes steam to heat the house or drive a printing press.

But in the spring under the powerful influence of the sun's rays, the sap starts up, the buds swell, the leaves unfold, and the green cells begin the separation of the carbonic dioxide into its elements of carbon and oxygen, the first of which elaborated into starch is carried into the sap of the plants (just as in the case of the carbonic acid made by the horse) and it is distributed to every twig, branch and stem, adding to their size visibly every day. When burned to ashes under the boiler, plainly it

gave up its force and descended from a high potential to a rezo potential. But now when the sun power is adding to the material of the tree, its potential is being raised and it becomes every day a center of greater force as a whole than it was.

Thus the sun is industriously engaged every day in our summer in building these centers of force, and in the southern hemisphere during its summer, and the year round in the torrid zone. On the other hand, every time a stick of wood is burned or whenever a tree dies and decays it gives back to the air its carbon in the shape of carbonic acid, to be incorporated in the tissues of a new center while it surrenders its energy and descends to zero potential.

We should note in passing that all the centers of force may be conceived as divided and subdivided, each limb or twig or leaf or cell or molecule or atom may be considered as an independent center either for rest or increase or diminution of its motion and energy. One leaf may be deprived of its light and wither and die. If an atom of a metal be hot while a neighboring one is cold, force as heat will pass from the hot to the cold.

Whichever has most will surrender a part to that which has less. It is only this, that force goes in the direction of least resistance

The amount of force imposed on any body of matter bears some relation to the amount of matter contained in the body. No kind of supernatural hocus pocus will enable an atom of Radium or any other substance to add to its lift-

ing power or its weight or confer more force upon another body than has been conferred upon it.

Looking over the surface of the land we find it covered with the activities of energy in process of being built up—ascending from lower to higher, or in process of prodigal distribution from the rich in energy to the poor.

Then we have to consider the sea, the water courses, the air, the clouds and the winds.

Think of the energy exerted by the solar heat in raising the surface of the ocean, which blown by the wind across the continents constitutes all the rains and all the waters of all the rivers. In the descending torrents flowing from the high potentials of the highest mountains to the zero of the sea level, the energy expended in their elevation is paid back. So of the water powers and mill ponds. And the coal beds scattered throughout the land are so many centers of energy in a potential state, expended by the sun ages ago, in producing the vast vegetation of the carboniferous age.

The same process is going on yet. The light rays of the solar spectrum still raise vegetation; the heat rays still make vapor and clouds out of sea water, and cause the wind to blow them over the land. When the clouds by condensation become heavier than the air, the latter now an overburdened center of force, drops them in the form of rain water and continues to drop them down the streams till the sea is reached; and the water in streams and rivers carries its burdens of timber and other vegetation to depositories

in the sea selected by the currents where the beds are formed, that long ages hence the oscillations of the earth's crust may bring to the surface in reach of man, if man remains here that long. But great as is the amount of energy exchanged from body to body, on the surface of the earth, a great part of which is not useful to man, it does not compare with the giant energy that lies dormant inside the crust of the earth.

It is generally agreed and there is every indication, that the inside of the earth is a mass of melted mineral of a potential energy the force of which is practically incalculable. This force is and has been for myriads of ages oozing out of the earth and radiating off into space—was in fact doing this before the crust was formed while the whole earth was a melted ball.

All the other planets are in the same condition, each having in a melted inside, a vast store of energy in the shape of heat which it slowly loses by radiation. The earth is said to be about one degree cooler by this radiation. But great as these planets are, and vast as the energy in heat they are centers of, they cannot be compared to the sun which is 500 times as large as all of them put together, and delivers many thousand times as much heat and light as they. It is not yet settled where the sun gets his great store of heat and light. Before the solar system was formed the matter now composing it was a mass of nebulous matter heated to incandescence and expanded as far as the orbit of Neptune.

It is believed by many that the present store

of the suns heat and light and the internal heat of the planets are the remains and continuation of the early-time nebular store, which in the course of time will be radiated away and lost to the solar system. It is not possible it could be annihilated or that it could be forever locked up in the interior of the planets or finally in the sun.

Times never had a beginning. If it were possible to lose by annihilation any energy in any time, in the infinite time past, it would all have been lost, and the universe would now be heatless, lightless,—dead.

The fact that there is still vast energy within our knowledge, is proof that none has ever been lost.

The sun then, will continue to radiate energy till its own potential is reduced to the level of that of the planets at least, unless by collision with some other burnt out system or cold globes gone astray, a new supply of heat is generated and a new system constructed.

In our discussions of scientific and especially of philosophical questions we are given too much to the abstract, forgetting that in practical life and consciousness we have no dealings with anything else except the concrete. For example, bodies appear to us under thousands of forms. They all oppose to us the attribute of resistance accompanied with extension, or they reflect upon us the light of the sun by which their shapes, sizes and distances from us are placed within our knowledge. By the exercise upon us of the various forces thus

numerously engaged, our consciousness is constructed and informed, and we learn by repeated experience and habit how very near and familiar to us is the external world of forces and bodies. But this is not true of the abstract. The abstract is the imaginary unadded and incomputable sum of all the things of a kind.

The sum of all the concrete will not make an abstract or an absolute.

Thus we see the bodies that furnish us the forces necessary to create feelings, are just plain physical bodies—the sun the greatest of all—and that the phenomena and energies they exhibit to us are simply phenomena begotten of their own motions and made transformable into ours.

CHAPTER VIII

The Psyche a Physical Organ.

Both Philosophy and Science require and admit the existence of a substance whose motions constitute thought and feeling. There is no objection to calling this the Soul, though I prefer the Greek Psyche as less liable to be misunderstood. We must always be careful to distinguish between the psyche and the mind, the latter being the collective name of the thoughts and feelings—the motions of the former. Now let us see what science has to say in regard to the Soul. First, during life, it is part of the body. This is

proved by the fact that all the actions of the body both voluntary and involuntary are caused by motions first set up in the environment, and through the senses and afferent nerves communicated to the psyche, and on through it down the efferent nerves to the muscles. The psyche is an essential piece of physical machinery, lying between the original source of power and the point at which it is to be delivered. It is like a pulley by which a man standing on the ground, may raise a bucket of mortar to the top of a building without climbing up himself. It is essential because the body is made to be worked in this way, and it could no more be dispensed with than could the systems of afferent and efferent nerves, or the muscles. It takes the whole combination to make a workable organic body, and each piece is therefore a piece of the body.

It is proved to be part of the body—by the further fact that like other parts, its activities subject it to wear and tear, and a constant drain of its substance, and that like them too it is constantly recruited and renewed by fresh substance, brought to it in the circulating blood. The principal deposit of the psyche or soul substance (though not the only one) is certainly in the skull, some of it is in the muscles as proved by the muscle sense. This locality in general receives one-fifth of the total circulation of the body, and the proportion is increased whenever active thinking is being done, even when it does not involve the action of the muscles. Thus the psyche draws its nourishment from the arteries and dumps its

waste into the veins just as the other parts do, and it loses its powers and functions when it is starved.

It is further proved by the fact that it like other parts, grows in power cleverness and dexterity by use and habit, such use and habit when taking place in connection with the activities of other parts, making corresponding improvement in all the parts co-operating together. Thus it is recognized that the nimbleness in playing the fiddle gained by practice, is in the psyche as well as the fingers. Skill in oratory includes dexterity of certain parts of the soul or psyche as well as the jaws larynx and tongue. The same improvement by habit and use is observed when the psyche alone is concerned with the action. This is shown in the increased ease with which school children learn to handle problems in mental arithmetic, in committing lessons to memory, and in composition. It is shown not only in what are called the higher activities of reason, judgment imagination comparison etc. but in the lower orders of perception also, as the following experiment will show. Let a subject be seated on one side of a room, on the opposite side of which is a screen which can be instantaneously removed showing two discs, one red the other black. He is instructed to raise his hand as soon as possible after he sees the discs. This will be found to require some fraction of a second—say a quarter—at first but less time after some practice. Now tell him that only one of the discs is to be exposed, and that he is to raise the right hand if he sees the red one, and the left if the black one appears. It

will be found to take three or four times as long to make the response as before. That is, the additional motions required of the thinking substance to reach the conclusion which hand it is that corresponds with the disc that has appeared, take additional time for their performance. But practice reduces this time too, and Prof. Exner saw it reduced in some of his experiments to one fifth of what was consumed at first.

It is further seen to be like other working parts of the body in the circumstance that certain functions may attain such facility of execution by it as to be done without conscious effort, and the character of the soul or psyche thus become so fixed and persistent as to be hereditary and transmissible from one generation to another, in other words to become instinctive.

The conditions of hereditary instinct are better seen in the lower animals than in man, but the principles are the same in all. That which anyone tends to do as soon as the opportunity occurs, without reasoning or training, is more or less instinctive. It applies to all the first acts of infancy involving eating, sucking, crying, playing, creeping, grasping with the hands; and as soon as the legs are sufficiently developed, to walking, running, climbing, etc. The amount of conscious or feeling, soul action consumed in these performances, is very small. They seem to do themselves. Long ancestral habit working certain parts together of, viz, nerves muscles and portions of soul substance, has welded the parts thus concerned in any special action, into a single

machine running easily with little friction when appropriately stimulated.

But observe that the part of the soul or psyche concerned in these instinctive actions is not a feeling part but only a thinking part. As life advances we continually grow into new instincts by doing repeatedly and habitually, things that at first we learn only by conscious effort and attention. Thus a girl will learn to knit or play the piano, and a boy will learn to skate or swim, by using great effort and suffering many failures; but when the lessons are perfectly learned the required motions are performed not only with little effort but often unconsciously.

This means that the feeling part of the soul as well as the thinking part was at first engaged during the acquirement of the habit or process but that after it was fully acquired, only the thinking part was concerned in it, and that as in the case of hereditary instinct the feeling part thereafter had little or nothing further to do with it. We have no reason however to doubt that the same movement that constituted thought while the lessons were being learned in consciousness, went on again every time they were practiced or repeated after the actions became partially or wholly reduced to instincts. This constitutes one strong proof that this psychic substance is competent to acquire by practice such facility in its function of thinking, that thinking can be carried on without arousing consciousness or feeling, because the thought involved in the action is never in any case anything more than the inter-

action and mutual modification of the polar currents constituting the stimulus, and its modifiers, and the final development from them of a will and motor nerve action; and this process must be supposed to go on whenever the action is performed, whether it be done in consciousness or not. Other proofs are found in the unconscious action of the cerebrum, or great brain, that is shown to take place both in sleep and in hypnotism and also during waking hours. The consumption of blood during processes of both conscious and unconscious cerebration is very marked and of course all used up, in exclusively mental operations. It need hardly be said that only physical activities require or could use the nourishment furnished by food. When the wind the sun and the rain beat upon the naked skin of a savage they have a tendency to toughen harden and tan it, and to thicken the epidermis and stimulate the production of hairs upon it, These effects act as a protection of the body against the activities of the environment that produce them, namely, the aforesaid wind sun and rain. A Pawnee Indian in Nebraska being asked why the Indians were able to go almost naked in very cold weather while the white men had to wear thick clothing, replied that the white man left his face uncovered and that made it tough. "The Indian is all face." The wind sun and rain also produce a feeling of discomfort, which is really in the brain. This feeling causes other motions to take place in the brain, that are designated thoughts, and these movements give rise to an impulse called the will

and this contracts muscles and moves limbs in such a way as to secure clothing to put about the body and in that manner obviate the efforts of the wind, sun and rain that started the feeling in the first place. Thus in two ways the forces of the environment control an organism, (1) by direct action upon its materials and constituents, called vital action, (2) by first moving its brain in the creation of feelings and thoughts, called mental action. Both of these are purely physical.

The soul or psyche is further related to the other working parts, in the fact that it loses its pliability, vigor and aptitude for being worked, by disuse either in the department of thought, or that of feeling. Memory consists in the renewal of a motion of the psyche—any thought or feeling—by any stimulation other than the one that produced the action in the first place. The oftener a memory is reproduced the brighter and more vivid it becomes, but if its revival does not take place within a long time, it becomes very difficult, and if put off too long it is impossible. It not only forgets the activities it once had, but also by the advance of age it becomes stiff and hardened so as to be incapable of taking on the activities it could have had in youth. This is shown in the extreme difficulty of teaching those who wait till middle life to begin their education. It is like teaching one to walk who had never been allowed to stand on his legs till he is 40.

✓ If the psychic substance did not deteriorate in quality and activity, just as legs and livers do, there

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is no reason why the mind and mental faculties should not retain their youth and virility. The removal of portions of the cerebrum of men and other animals is accompanied by loss of some memory or other mental qualities, or of will-power.

Experiments have shown that our swiftest thoughts require from 1-8 to 1-10 of a second. All sensations cause a rise in temperature. This has been proved not only of the waking hours but during sleep, and the unconscious cerebral action. In the case of a patient a part of whose skull had been removed, the brain visible, through the fracture, was seen to beat faster whenever he was spoken to, although he was fast asleep.

It matters not what sort of a mental process goes on, we observe that it requires in every case the expenditure of blood. If we take a run of a few rods we find the circulation of the blood greatly accelerated, which means that the violent exertion has rapidly oxidized tissue, mostly muscular and nervous. But an acceleration of the circulation may take place through purely mental excitement. Horror, fright, anger, rage and all the more violent emotions instantly increase the circulation when it is obvious that the expenditure of tissue is that of the feeling substance alone.

The heating effect of mental work and worry, when the action is entirely separated from muscular exertion is shown in the slang threat to "make it hot" for an antagonist; and in legal slang the witness stand, called the "sweat box."

Note how the emotions work on the physical

parts in causing gestures, tears, laughter, frowning, sulkiness, cries of terror or pleasure. How under the stimulation of strong feelings a man is twice as strong. As the rustic bully put it—"When I am pleased I weigh 180 pounds, but when I'm mad I weigh a ton." The story is in point, of the old woman who on an alarm of fire carried out her box and contents, all her wealth—which it took two men to carry back after the fire was put out.

The action of the feelings, or as sometimes said, the mind, upon the secretions of the milk glands, tear glands, etc., is further proof of the physical nature of the feelings. This is often spoken of as the control of the mind over the body. These glands are physical organs and can be controlled only by physical agencies. The influence therefore of the mind, feelings and mental status prove them to be physical.

The secretion of milk is affected both in quality and quantity by the mental state of the mother, such as a fretful temper, fits of anger, grief and anxiety of mind. A case is related of a woman who furiously interfered in a quarrel between her husband and a soldier, who was billeted in their house, she snatching his sword and breaking it to pieces. The neighbors quelled the riot, and shortly afterward the woman gave suck to her infant a strong healthy child that had never been sick. In a few minutes it became restless, panted and before a doctor could reach it, died.

A similar case is given of a little puppy that suckled its mother shortly after she had been thrown

into a violent rage by a quarrel with another dog. In a short time it was thrown into epileptic convulsions, from milk, poisoned by rage;—a feeling. There are other secretions that are affected by one kind of feeling or another. Tears are made to flow by grief, joy, anger, tenderness, etc.

Experiments have shown that after dogs and pigs have been made to fast for sometime, and then shown food which they are not allowed to eat a flow of gastric juice into the stomach will take place, a physical action produced by hunger—a feeling. Any required number of cases could be cited of examples of the action of feelings, in changing accelerating, retarding, vitiating or improving such physical secretions as the milk, saliva, tears, gastric juice, etc.

Mr. Herbert Spencer on page 211, *First Principles*, says:

“Many will be alarmed by the assertion that the mental forces come within the generalization,” that a connection exists between the vital and physical, and that the mental forces are correlated directly with corresponding external physical forces, in the production of feelings. The correspondence between them is quantitative as well as qualitative. If for example, two weights are made to press upon us, the feelings generated in us are in proportion—the most intense feeling being caused by the heaviest weight, so, in stopping two bodies in motion the one having the greater force will create the liveliest feeling. In the same way the feelings of sounds as

of bells, strings, horns, etc., vary from each other as the forces furnished by the instruments tested, by physical measurements. So bodies having contrasted temperatures as proved by the thermometer arouse the corresponding contrasts in feeling. The same effects result in our feelings from contrasts of light and heat. The feelings thus formed imitate the actions of those bodies in the external world that constitute their environment. Following the sensation, further nerve action is often propagated that passes into muscle contraction of limbs of secreting glands to respiratory muscles and the heart and whole vascular system. The inspiration is hastened by the passage from darkness to sunshine.

The sensation caused by tickling is followed by uncontrollable movements of the limbs, any sort of violence in the stimulation is accompanied by corresponding violence in muscle automatic action.

There is also a connection depending on chemical conditions, between the brain and mental action, an important factor of which is phosphorus which is supplied abundantly during the prime of life, but sparingly in infancy and old age and to idiots. The production of thought and other mental activities depends other things equal, upon the supply of blood to the brain, a failure of which almost instantly produces unconsciousness. Too much circulation on the other hand produces mental excitement—perhaps delirium. Then the blood must be right as

to quality as well as quantity in order to secure correct mental action. It must be properly aerated. So that it is clear that mentality requires blood and oxygen for its support, just as do the respiratory, muscular, vascular and all the rest.

Excessive mental activity produces increased excretion by the kidneys, from the blood, of an increased quantity of alkaline phosphates.

Certain morbid excretions through the skin of insane persons show an effect of mental states on the vital conditions betraying themselves, by what is called the "peculiar odor of the insane." Then note the effects of hunger on decreased vigor of thought quickly relieved by normal refreshments.

Also the stimulating effects on our psychic organs of stimulating drugs medicines liquors and alcoholic drinks, also the mild stimulations of coffee and the "cup that cheers but not inebriates." The forces expended in the production of our mental conditions viz. pressure, heat, light motion sound etc. are produced by the same physical forces that are otherwise employed in handling parcels of matter, in constructing, crushing, melting, etc. The same sort of force that smashes a rock, differently conditioned may help to build a syllogism.

The facts are that motion heat light chemical affinity etc. are transformable into each other and into sensation, emotion and thought, which are likewise transformable back to the first—all of

them to be classed as the modes of motion of physical bodies.

"That no idea or feeling arises save as a result of some physical force expended in producing it is fast becoming a commonplace of science." (Spencer p. 217.) Some of the above facts constitute the capital stock of the mind-cure and Christian Science people. They find some diseases—(not nearly so many as they think)—curable by the shifting of some glandular secretions, by the overflow of feelings.

They give all the credit of this to the mind and regard the mind as something above the body, in fact its master and governor. They forget the afferent or mind forming part of the psyche and seem to be ignorant of the existence of such a side. The feelings must be made before they can act, and they are made by the conditions of the environment. Thousands of conditions in the environment tend to elevate, give buoyancy, gladness, happiness, love, while other thousands are ready to erect the psyche into a machine for producing feelings just the reverse—to depress, discourage and render miserable and hateful. The true treatment in the Christian Science cult and such like, is to cultivate the environment that it will produce the kind of feelings wanted. This is the work of the "healer" who must manufacture the feelings which the environment might otherwise neglect to deliver. Now it is plain that the "mind" or the psyche or the part that thinks is no more master of the body, than last year was master of this. Of

course it is a necessary link in the chain of causation, but it originates nothing and gives no more than it gets and passes it all on to the next link, in the movement of gland or viscera or muscle.

Now the point I wish to lay stress on in this connection is that this middle factor which they call the mind but I call the psyche is a physical body. It is a body and not a motion. (The mind is a motion or a bunch of motions.) But the Psyche is physical because it possesses resistance; since it is able to arrest the physical motions of the environment, and to become modified and rearranged by them; and further, since it possesses resistance it can become an agent for the reception and transfer of energy. Only a physical body can receive or deliver energy. It does both.

That is it takes the energy of the heat the light, the sound, the odors and savors, the pleasant temperature of a summers day, the beauties in flower and leaf, in stream and field, in clattering mill in twittering birds and restful flocks. Reflections of these and from these, constitute the energies of the environment, that striking into our brain, form the sense bearing psyche with its blooming sensibilities in potential poise, ready to liberate themselves in the direction of least resistance upon gland or muscle.

Every sort of force applied at the cut end of a nerve, produces in it a nerve current running to the brain at a speed of from 50 to 300 feet per second. Such nerve current is produced by

touching the nerve with any substance, as with a feather or by pinching, or by a magnetic current or electricity or best of all a galvanic battery.

Galvanism is extremely like the nerve currents, and the muscles are irritated to perform the same movements that are performed by the natural nerve current.

CHAPTER IX

Mind the Motion of the Psyche.

We are constantly met by the assertion that the mind, or else the soul—and not one in a hundred knows or makes any distinction between the two—this soul or mind is superior to matter must have existed before matter—in fact created it and runs and directs it. My body they say is subject to my mind, is ruled by it and moved by it and is made sick by it, and healed by it. The body waits upon the mind and only moves as the mind dictates. This being the case with our small organisms they say, it is even more the case between the great “over soul” or mind of the universe they call God, and the material body of matter or substance called nature. They say nature moves according to rules and regulations laid down by God. Because matter could not of itself do anything or direct itself but would fall into chaos and ruin.

In answer to these propositions.

First I define the soul or as I prefer to call it the Psyche, as the part of the organism whether human or brute, that feels and thinks, and reflects nervous energy. The mind is the **movement** of the psyche, and psyche is composed of parts, and the varied movements of these parts constitute different qualities of mind action—three in number, which I have named **first; reflex action**, consisting of the stimulation of the spinal cord, and the lower brain centers, by movements outside of the body, which impinging on the skin, the organ of general sensibility, send nerve currents through the sense organs to such centers, from which they are reflected back to the muscles, contracting limbs and executing various physical motions in unconsciousness: **Second** automatic action of the cerebrum, which originating with a stimulation derived from the environment of the **brain**, which environment may be either outside of the body or inside of it or both; goes on indefinitely in action constituting unconscious thought.

Third is Feeling including sensation and consciousness, and comprising all the cerebral actions involved in the production of **conscious** thought, pleasure and pain and all the sensations coming into the psyche from the environment by way of the senses.

The processes of unconscious reflex action and thought, are well understood to be purely physical. When the foot of a sleeping boy is unconsciously withdrawn from a tickling feather, we can trace the movement of the stimulation from the molar or mass motion of the feather, becoming a nerve

current at the surface of the skin, which flows to the cells of the afferent ganglia of the spinal cord, or the medulla oblongata or both; thence crossing over from the afferent to the efferent cells, thence by the efferent nerve back to the neighborhood in which it started, ending in the transfer of the nervous stimulus to a muscle, contracting it and withdrawing the foot.

All this is just as mechanical as a telephone. In no stage of it is any force or energy created, at each step we see just where the energy came from and what became of it. All of the psyche that was concerned in the transaction was first put in motion by a force in the environment, which motion was transferred by the psyche to the muscle. The psyche did not originate the action, nor did it add anything to it. This is a vital point. For if it could add any force of its own it is obvious it would either have to build that force out of nothing, or have it supplied to it from a source outside of itself. The former it cannot do if the law of the conservation of energy is valid. If the latter happens it proves the psyche (or that part of it concerned in this transaction) to be dependent for its motive power, on physical energies outside of itself which yields my contention. The actions at both ends of this chain of causation are obviously physical, or the movements of physical bodies—the feather, and the muscle. It is not possible that the intermediate motions of the nerve current and the of the same from the afferent or sensory afferent or motor cells in the ganglion of

the spinal cord can be other than of the same nature as the first and last ones, viz. physical.

It is true that in this case when the nerve-stimulating current reaches the muscle, it liberates a force that has been stored up previously in the muscle, and this force that contracts the muscle, is greater in physical amount than that small nerve current that touches it off just as the pulling of a trigger, lets off a much larger force in the explosion of the charge. But the essential contention is that the stimulation being a motion of a physical substance at the beginning it continues forever after to be a motion of some physical substance, so that every link however small in the chain from feather to muscle must be a physical substance, and the psyche being a part of this chain, it is as physical or material as the rest. If the psyche or that part of it concerned in this example resides in the nervous ganglions of the spinal cord or medulla, we see that the nervous stimulation arising from the tickling first stirs up the psyche, which then signals the muscle to contract. But the psyche does not act till it is acted upon. It does not originate the movement, and if the afferent nerve were cut, the psychic ganglions would not receive the stimulation, or forward it to the muscle and the foot would not be withdrawn. Thus we see that this psyche does not govern the body except as it is itself governed by the environment. Much like the central office of a telephone company, it is a link, and an important one but no more essential or less physical than the other links.

There is then some color of truth in the affirmation, that the body is subject to the mind.

It is one of my chief contentions that all the motions of the body are caused originally or remotely by sensory impressions, darted upon the psychic substance, and that the disturbance caused there is passed on to the muscles and the viscera and so end in the government of these organs. The mind being understood to be the motion of the psychic substance, to be its feeling in fact, we can properly say that the psyche controls the body by means of the mind, as we might say, a man moves his body by means of the movement of his legs. That is, the psyche a material organ, moves, when it is made to, by an external application of energy, and its motion, called **mind**, is communicated to nerves that conduct it to the muscles and other organs to be moved. So the mind appears in this chain as one of the factors, or rather as one of the means, by which the environment controls our actions, and it is easy to be misled into the incorrect idea that the mind is a power in control.

Some say that no motion of physical substance can constitute feeling; but admit that the conditions in the environment affect and influence the formation of feeling, and determine its nature. This admission is fatal to the first contention. Feeling must be either a motion, or a piece of material substance. It is certainly not a substance. It is a motion of a substance getting its stimulation, from bodies in the environment. There is a chain of physical movement from the

environment to the sensorium. The motion it gets up there I contend is feeling. According to the other man it only leads to feeling. But wherever we find feeling it will be at the extremity of such a chain of physical causation, to which stimulations of a physical nature and origin have led by contact, from beginning to end. This brings us at last into the presence of the very substance that feels, and proves its material nature. If the nerve motion is physical it cannot constitute sensation, or lead to it unless that too is physical. Beginning as a physical motion each step it takes and each contact it makes is physical. There is no escape from this conclusion, except an assumption that the external world has no influence in forming our minds which is absurd.

An apparatus may be constructed the action of which, very closely imitates that of the psyche. Suppose in a dark room there is a dynamo, connected with which by a wire is an arc lamp. A few feet away is a glass jar containing passive chlorine and hydrogen in equal parts. A shaft from the Dynamo, extends from the room to a steam engine outside. Let the steam engine start up and the dynamo will revolve.

The carbons of the arc lamp will glow with incandescence and lastly, the two gases in the glass jar which up to this time have taken no notice of each other, instantly rush together with a loud explosion, chemically uniting to form hydrochloric acid. In this illustration, the engine outside, is the external world, the environment,

the dynamo is the sense organ—eye or ear etc. The carbons of the arc lamp are the psyche. Its **light is the mind the will**. The action of this light in causing the chemical combination of the two gases is like that of the will, a part of the mind in causing the contraction of muscles. While the chemical action that takes place, has its parallel in the union of oxygen with some of the carbon in the muscles forming carbonic acid.

In both these cases we have machines constructed from material substance, corresponding with each other. But there is one factor in each that is not called substance, but a mode of motion that is the light in one case, and correspondingly the **mind** in the other. This is something more than a mere similarity. There is a measure of identity between light and mind. Each is a motion. The term light is applied in two ways. It is primarily, the undulatory or wave motion of the ether, but to our senses it is the sensation of illumination, a part of our mind. That is the way it appears to us, but objectively if seen from the outside by another person it would be seen to be as it primarily is, an undulatory motion identical with that of sun light, or electric light.

The mind or the motion of the psyche is therefore not the controller of any matter except that with which it is associated in an organized body, and then only as an agent or servant of forces outside of itself in its environment.

Has the soul weight? According to the papers, certain scientists are making experiments to show weight of the soul. On the theory that at

death the soul leaves the body, it is held that the difference in weight of the body just before and just after the moment of death, is the weight of the soul. Of course by my theory the soul being the brain or the greater part of it weighs perhaps as much as 30 oz. or more, and at death does not leave the body.

A man weighing say 2,000 oz. would have a brain of 50 oz. of this there is probably 40 oz. engaged in the purely physical activities of operating the muscles, heart, lungs, stomach, and other viscera; mostly by activities automatic and unconscious, leaving 10 oz. to perform the offices of the intellect, viz thought reflection memory consciousness and feeling. Now granting that a man a moment before his death, weighs 2,000 oz. and again a moment after weighs an ounce and a half less, that is $1,998\frac{1}{2}$ ounces; where is the proof that that ounce and a half is the weight of the soul? What we really know is that the whole body including the brain has shrunk from 2,000 to $1,998\frac{1}{2}$ oz. or 1-999 of the whole. This does not seem a large shrinkage to be divided among so many parts from which there are considerable exhalations, of heat, moisture carbonic dioxide etc. But suppose we admit that the brain is the soul or the seat of the soul, this ounce and a half is still not the weight of the soul, but allowing the shrinkage to be exclusively that of the soul, the ounce and a half will be only the shrinkage of brain weight or soul weight. But if the brain is the soul the soul must weigh not less than 10 oz. and possibly 50 oz. From this standpoint, and in

view of the fact that all parts of the body are subject to their proportional share in this ounce and a half shrinkage, the part belonging to the soul is practically nothing.

I have demonstrated elsewhere that the soul is a material substance, possessing weight and resistance. This weight test supports this view so far as it supports any; for unless the soul has weight, it could not lose any by the death test. But most likely the parties in charge of these experiments, will assert that the soul is immaterial, and that it consists of thoughts, feelings, etc. I have shown that thoughts, feelings, etc., are the motions of the feeling substance, and therefore physical forces, which are by their natural functions transferrable to the limbs, etc., stimulating in them their normal actions. The direct and primal action of thought or feeling is its transfer into will and nervous current. Theoretically this nerve current has a measurable physical force. But it cannot be arrived at by weighing the body, or even brain or soul whose motion it is. We might as well expect to arrive at the force of a charge of powder by weighing the gun it is fired from.

The mind is rightly named a mode of motion.

Every body is condemned to motion, but the motion of no two bodies is alike, the mode of motion depending upon the peculiar construction of the body, and the sort of force that is applied to make it go.

For example a wheel naturally rolls. The man that rides it has a different motion because he is constructed differently. The force that drives him is different from that which drives the wheel, although finally the food the man eats furnishes the force that drives them both.

So, the flag flutters in the wind. The flutter is its function, the wind its motive power. Note the evanescence of the flutter. It stops the moment the motive power, the wind, comes to rest. Is there any way to save and preserve that flutter? Evidently the moment the flutter ceases it is dead, and it is dead for ever. We still have the flag, and some day the wind may blow and make the flag flutter again, but it will be a different wind, functioning a new generation of flutters.

The mode of motion of the psyche in the creation of mind, brings it into the class under the denomination of molecular motion, that is, the motion among themselves of the molecules of a body while the body as a mass might be at rest.

Heat, light, electricity, sound, galvanism, nerve currents and others are examples of the molecular functions developed by the action of molar forces under different conditions. The motion of the soul (psyche) under the stimulation of nerve currents lets itself off by a molecular agitation that appears to us as feeling. Each feeling thus begotten endures for the infinitesimal period occupied by a single wave of the afferent nerve current. As long as the same stimulus from the external object remains in activity the feeling will be successively

renewed by the incoming waves so rapidly as to make the feeling appear continuous. But the feeling stops and ends, the moment the nerve current stops. When we are educated it is the psyche upon which we spend our efforts, and we fashion it as Edison fashions the cylindrical records for his phonographs. By shaping the instrument properly, we make it produce any kind of a mind (or motion) we want. Mind is suspended and remains unmade during sleep unconsciousness, catalepsy, suspended animation as from a blow on the head, intoxication etc. In all these cases **there is no mind**. It is not merely in abeyance; it **does not exist**. But the psyche, the instrument for the production of mind and feeling, is still there, and the forces of the environment are there to inject their influence upon the psyche through the organs of the external senses, and the organs of the internal senses—portions of the psyche itself, are there. When they wake up and the circulation of the blood is again stimulated up to the requirements of the waking activities, feelings are formed by the quiver of whatever part of the psyche is stimulated by the force from the environment, in the shape of seeing hearing pressing etc.

A new born baby has no mind. It has the psyche—(soul-brain), and with its earliest breath it receives stimulations from its environment. The education of its psyche begins instantaneously in the form of differentiations in its substance that constitute organs of memory of feeling, and later perception.

A part of the stimulation that is projected upon the soul during a condition of wakefulness, begets in it, feeling and its derivatives, memory and will. Another portion passes on without arousing feeling, and produces automatic instinctive unconscious actions some of them of service in neutralizing uneasy postures, and some known only after their occurrence, are odd and unaccountable even to the subject himself.

In most conscious cerebral action, thought is developed in which feeling is enlisted as a most important factor.

In sleep there is no mind—the motion of the psyche having ended, the mind has ceased to be. In sleep it is the psyche that sleeps, and while it is thus motionless its motion being mind, it follows that mind has ceased to be.

But the psyche wakes up and moves under stimulation. Then there is feeling again, and mind is being manufactured, at a rate depending on the health and vigor of the psyche, and the force of the stimulations darted in from objects in the environment or evolved by the mutual interactions of the sensations and memories already accumulated there, under the name of the internal senses. In unconscious mental activities such as dreams, the acts are such, as have been performed or have been possible in waking hours; also in somnambulism where the subject digs in the garden, saws wood, walks over the top of the house, steals his own clothes and buries them. In such cases a part of the psyche is alert and the

actions performed, are instigated by this part unbalanced by the rest of the organ.

From feelings or sensations are derived all other mental action.

A reason is only a feeling that such or such a thing is so. That two and two make four is a compound feeling—2 sensations fused into one to make a perception.

Max Muller points out that the word belief, comes from the German *belieben*, which means love. Our beliefs are our loves, that is our feelings. All knowledge is built upon plain sensations and when you demolish the superstructure, if you come to well defined sensations, you have reached the bed rock, of axioms, and can go no further.

CHAPTER X

Feeling a Necessary Physical Factor

In "Animal Automatism," Prof. Huxley says: "The argumentation which applies to brutes, holds equally good of men and therefore that all states of consciousness in us, as in them, are immediately caused by molecular changes of the brain substance. It seems to me that in men as in brutes, there is no proof that any state of consciousness is the cause of change in the motion of the matter of the organism" * * * "it follows that our mental conditions, are simply the symbols in consciousness, of the changes which take

place automatically in the organism; and that, to take an extreme illustration, the feeling we call volition is not the cause of a voluntary act, but the symbol of that state of the brain which is the immediate cause of that act." Prof. Huxley's view then was that, the stimulations come in from the environment through the senses and work the machinery of the organism from first to last as an unconscious agent; and that the consciousness that may blossom forth is a sort of ornamental accompaniment, one of the results of physiological action but not at all necessary to the working of the machine or contributing to it.

It is certainly true that much work is done by the machine in which consciousness is not a factor or even a spectator. We do thousands of things of which we are not conscious at the time and many that we are never conscious of. To say that consciousness is a motion, is not saying that it is the only motion. In some of the combinations of action that take place in the nervous machinery, consciousness is not an essential factor, but in others it is. If consciousness is not a cause of anything but only a symbol of the real causes that operate the nervous machinery, it is difficult to see what could have been the reason of its being. What is a symbol for? Nature is not in the habit of developing or preserving a power, habit, or function in an organism that is not useful to it. Whatever we have inherited from our animal ancestors either of form or function that is not useful to us, we are as a gen-

[illegible]

and make an effort to get it, that does not experience the sensations of pain and satisfaction, or at least, whose ancestors have not experienced them. In all cases where sensations of uneasiness are felt, they control or influence the action of such animals. This is more particularly true of man than of any other animal. He has a far greater number of sensibilities and performs a far greater number of actions; and every one of such actions performed in consciousness, voluntarily, is instigated and caused by a feeling of uneasiness or doubt; and the object of such action is in every case to get rid of such feeling. It is well to explain here why I exclude satisfaction or happiness from the motives of action.

Only such stimulations as are actually felt can be motives of voluntary action. Anticipated happiness is not felt, but only wished for. The desire to acquire a happiness is born of a comparison between the present state, and a prospective state as pictured in the imagination. The disparity between the two as the imagination thus pictures it, excites the feeling of relative dissatisfaction with the present state, and leads to an effort to get out of it. A man already rich is commonly uneasy because he is not richer, and so is constantly spurred on to escape from the misery of his present (relative) poverty.

If satisfaction is by any possible miracle ever attained by any one, effort ends and stagnation follows.

With the lower animals that have small capacity for comparison, the feelings of uneasi-

ness are confined to relatively few subjects. If the belly is full and they have a cave or hole in the ground or warm nest for shelter from the storms, they are satisfied, and rest. But the wear and tear of tissues that goes on even when the action is nothing harder than breathing, at last empties the stomach of an animal. The uneasiness of hunger comes on and drives him forth, and the memory organs inform him where it can probably be relieved.

The feeling of pain, uneasiness or relative dissatisfaction, then is the sole and only cause of all human action that is not unconsciously instinctive or unconsciously automatic or reflex.

The animal organism is thus a machine run by the environment, by means of its psyche, just as a clock is run by a weight pulling on a string wound around a drum or pulley.

As intimated above, some of the actions performed by men and nearly all of those performed by some of the lowest animals are done instinctively without the co-operation of consciousness. Such actions depend on the fact, that habit long continued, in the performance of any particular sort of action, begets a facility for the performance of such action, by differentiating the parts of the brain and body concerned in it. All are familiar with the fact, that "practice makes perfect." The same sort of practice continued from generation to generation, each inheriting the accumulations of all its predecessors, finally produces organic machinery that runs with

such extreme facility that there is not enough friction to arouse consciousness.

When the machine thus becomes instinctive, progress is at an end. The action does not change if the instinct is perfect, and the stimulus from the environment remains constant. A few of our actions are performed now precisely as they were by our ancestors a thousand generations ago. In those particulars we are crystallized and finished, and beyond the liability of progress or change. But the case of conscious actions is different. These are instigated by uneasiness, a feeling which is entirely contingent upon conditions in the environment that are in a state of perpetual change. All progress and advancement, all change for better or for worse, depends upon the irregular struggle the environment puts upon us, by exciting in our feeling apparatus the various sorts of uneasy sensations.

It appears, then, that the feelings are not merely ornaments of little or no use except to make us miserable; but they are business functions of the most important nature, since they constitute the wheels, pulleys, and pinions by which the forces of the environment operate us.

Nature has no interest whatever in our happiness. The law of evolution is the law of the preservation of the fittest, which means the strongest, the most ingenious and skillful, the cheapest and most economical, and those most sensitive to pain, but not necessarily, those susceptible to happiness, and courting rest.

Another important consideration is, that the feelings constitute a potent factor in the preservation of the race through natural selection. An animal that can feel, can by his feelings be warned away from many forms of danger. He will avoid an injurious exposure to fire or frost; avoid allowing himself to be beaten or bruised, suffocated, choked, starved or famished, torn by beasts, stung by noxious insects; avoid exposure to rain, snow and sleet. Animals, the most competent to suffer upon exposure to these destructive accidents of nature are the ones most likely to avoid exposure to them, and therefore, most likely to pull through in the struggle for life. Since man with more and keener sensibilities than any other animal, has advanced far beyond all the rest, we can hardly fail to see the importance of his feelings as a factor in his evolution and selection for survival, as the most preeminently fit animal on earth.

Now, if it is true, that feeling induces or governs the motor acts of men or brutes, and that feeling is a state of consciousness, it follows that states of consciousness are "the cause of change in the motion of the matter of the organism." We know very well that when the feeling is different, the action is different, and where there is no feeling, there is no consciously voluntary action. Carpenter in his physiology relates the case of a tramp who came one evening to a lime kiln; which had been charged with lime stone and was ready to be burnt. He lay down on a platform level with the top of the kiln allow-

ing his feet to extend over the edge of the kiln. During the night, the workmen not knowing the man was there, set fire to the charge, and the gradually increasing heat failed to wake him, probably because of the benumbed condition of his nerves, until one of his feet was completely destroyed. He felt no pain and did not know anything was wrong till he tried to rise. Now is it not sufficiently evident that in this case, if there had been a feeling of pain, the foot would have been withdrawn and it was not withdrawn only because there was no pain. It will not do to say that the real motive force is something beside the feeling. The case of the boy with his burnt finger snatched away because it pained him, is in distinct contrast with that of the tramp who allowed his foot to be burnt off because he felt no pain. Both cases prove the business quality of a feeling. In the case of the boy, we do not find that he pulled his finger away first and incidentally felt the pain afterwards. The feeling came first, the action following it. Ask him why he jerked it away and he would certainly say, because it hurt to leave it there. If the feeling itself were not the motive, but accompanied by another motion that really did the work independently of the feeling, the absence of the feeling ought not to stop the other motive, and in such a case as that of the tramp, the foot ought to have been withdrawn by this active invisible partner.

As observed above there are many actions performed by us that are done independently of

the feelings. Many instinctive and reflex acts are so performed, and in somnambulism and sleep, such acts are the rule. In instinctive and reflex action, the organized machine is worked along well beaten and frictionless tracks, that habit has worn smooth and facile. The actions that are now performed in unconsciousness were once done with effort, consciously, but by long habit have become instinctive, and no longer require the incentive of uneasiness as a motive for their performance.

All our conscious actions are in the final analysis, as automatic as those done in unconsciousness; the difference being that in the latter string of causation, there is one more term, viz., consciousness. But that term is the product of the environment, the same as the rest, and what we think we do, is only what the environment makes us do.

The quantity of motion consumed in feeling, it would be difficult to measure—it may be very small, but that motion is consumed in it is proved abundantly. Fright, a feeling, will turn a man's hair white, which means that such particular feeling is a motion of some special part that communicates motion to certain nerves which in turn communicate motion to certain blood vessels, and secretory organs, that in turn cause a precipitation of pigments that otherwise would proceed to the hair. Again, red a feeling or sensation—and there is really no generic distinction between the two—will under certain conditions stop a railway train. Red is the danger color

on railroads and if the engineer by looking at the light, experiences in consequence thereof a feeling, **red**, that motion is darted from the cell in which it is generated upon the nearest efferent nerve, which conveys motion to other nerves, thence to muscles, the contraction of which pulls a big lever, reverses the motion of the steam in the cylinder; another contraction, applies the brakes and the train is brought to a standstill. If the engineer, when he looks at the light, experiences the sensation **white**, none of these effects follow, there is no nerve motion, no contraction of muscles, no stoppage of the train. Now, the external motion in the undulation of solar radiation that begets in us the sensation **red**, is a vibration of 395 trillions per second. The sensation **white**, is produced by vibrations at the rate of 395 trillions per second, with other vibrations at various rates up to 871 trillions. These light or color undulations, produce other effects upon the tissues of animals and plants, and upon minerals, showing them to be forms of physical energy, and competent to move a physical machine. So a physical motion—undulations—begets a sensation—**red**—the sensation begets further physical motion—nerve and muscle. So we have three motions, each caused by the one preceding it, yet Prof. Huxley and others have held that, the middle one is not a motion although it is proved to produce the last motion, and to be itself caused by the first.

Certainly Huxley's scientific instinct was off

guard when he gave himself up to such a transparent error.

Again, the feeling disappears when it sets up motion of another kind, at least it disappears in part or to the extent to which it sets up such motion. When feeling—say a feeling of duty—sets up a volition—and **every volition is set up by a feeling**—the feeling disappears, or as we express it is satisfied. Volition is also a motion of brain tissue, and it is on a strain until its force is worked off upon the contraction of a muscle, and as soon as that happens the will—that particular will—ceases to exist. Thus all sorts of mental activities act like other forms of motion in disappearing in giving birth to other forms of mental activity or physical activity. Severe pain is always alleviated by diverting it into other forms of motion. It is pain alone that withdraws us from danger, and it must do it by, in some way, creating a nervous current in nerves, and this being a physical phenomenon, its cause must be physical.

We never form a volition except upon the stimulation of a feeling or emotion. All of our actions, when they are purposive are performed for the avoidance of pain or uneasiness, and are instigated by those states of feeling that are aroused by the recollection of painful or pleasurable feelings that we experienced in the past. No other conclusion is possible, than that feeling is a necessary business link in a physical chain.

CHAPTER XI.

Unlikeness no Argument

Let us consider another quotation from Huxley—"No similarity exists nor is indeed conceivable between the cause of sensation and the sensation;" by which he means that a mode of motion like the nerve current, and its antecedent impression on the sense organ, is infinitely dissimilar from the sensation produced by them. He therefore accepts the doctrine of the immateriality of the sensations. According to my view all such motions are motions of matter, and are therefore related forms of energy capable of being directly or indirectly converted into each other, sensation being as physical as the others. It does not follow however that we can perceive a similarity between the sensation and the other forms of motion. But this need not surprise us, for there are thousands of motions all clearly physical and interchangeable, that are extremely unlike to the uneducated senses.

For example, take the familiar act of lighting a match. First the match must be drawn over a plain, but not too smooth surface. This is called a molar motion because the whole body of the match is moved as well as the hand that holds it. The immediate effect of this is heat, as we commonly express it, in the match and on the surface over which it passed. This heat, which consists in the violent undulatory motion

of the ether in and about the so called hot objects, is called a molecular motion. As the operation is brought to a close this heat motion becomes more intense, and is presently succeeded and accompanied by a burst of flame. This too is called a molecular motion. Now here are three forms of undoubted physical energy all different; so different, that their relationship and equivalence to each other were unknown to the human race, till about the beginning of the 19th century, the experience and observation of a thousand preceding generations having failed to discover them. We cannot blame them, for surely the dissimilarity between the motion of a hand, and the flame of the burning match, appears infinitely great. Again consider two phenomena that all will agree are both mental, and both functions of the same or similar sorts of feeling substance, say a sight, as a sensation of red for example, and a sensation of sound as for example, a bell. Now is it possible to make any comparison between these two sensations of bell (sound) and red? We know they are related phenomena; we call them both mental; but is there any more resemblance between them than there is between one of them, and one of the three physical motions concerned in the burning of the match, as for example, between red and scratch? The whole five are totally unlike all around. To the ancients flame was fully as mysterious as red sensation is to us. Prof. Huxley admits a nerve current to be a physical motion; as physical as, for example, the driving

of a nail; yet what striking resemblance is there between them? Of course all this sort of comparison proves nothing. Our unchecked and unaided subjective impressions of external objects are no sure guide to their nature and relationships. But the comparison shows this, and it also enables us to see the weakness of the argument that bases its objection to the theory of the physical nature of the sensations, on the mere unsupported **feeling** that they are not physical. True, feeling is all we have to judge by and feelings are the final court by which all questions must be settled. But I insist that the court be informed before rendering judgment and not be governed by mere prejudice or superficial observation. When it is so informed, the fact that red is a motion of feeling substance set going by a physical agency, and therefore itself physical, will appear no more marvellous or improbable than that heat is a motion of ether.

It will be a matter to be settled by scientific criticism and proof, not prejudice nor uneducated feeling. If the proofs point out that red sensation is a motion of feeling substance we shall be obliged to accept the conclusion even if we have to quite remodel our preconceived notions, just as we did in regard to heat.

I am far from denying that it is difficult to conceive that a motion of a material substance is feeling, and still more difficult, or even impossible, to conceive **how** it can be feeling. In order to conceive a thing to be it is not essential to know **how** it can be. Oftentimes a much smaller

capacity is required to know a fact than to explain it. A savage with small mental equipment, knows that grass grows, but he cannot tell how. So in this case I am more concerned first, to establish the fact than to try to explain it, since our best attempts get no further than plausible hypotheses. If the facts show that the motion of a peculiar substance is feeling we are bound to accept it and trust to the future for its explanation.

Those who reject the Materialistic theory give the credit to an immaterial substance.

Is it harder to understand why or how a mode of physical motion can produce the mental phenomena, than to understand how spiritual motion can do it? How is it possible to conceive that spirit can produce feeling by its motion—destitute as it is of resistance, or the power to receive an impression of any force from a body in the environment?

CHAPTER XII.

Resistance the Source of Feeling

Huxley says, "the sensation of muskiness (or any sensation) does not possess the quality of Resistance, and so, he regards it as immaterial. In writing this he was evidently comparing sensation with matter itself instead of a motion of matter. Resistance is an attribute or condition belonging to matter. Neither resis-

tance nor any other attribute of matter is to be predicated of motion, no matter to what sort of a body, the motion is attributed. Considered by itself, it possesses no resistance. In this respect, sensation is on the same footing as other forms of motion. The motion of a ball thrown into the air, the motion called heat, and sensation, all alike, are motions of some physical body. There is no abstract motion or motion outside of a body.

When a ball moves, the motion is the motion of the ball. In heat and sensation, or feeling, the motion is that of the substance called ether. It is resistance which is reckoned a quality of matter, that enables or causes the transfer of motion, from one body to another. When a body is in motion, and meets with no obstruction, it does not lose any of its motion. It is only when a body No. 2, stands in the way of the moving body No. 1, and obstructs or resists its motion, that No. 1 loses any motion. The resistance of body No. 2, is the measure of the motion that No. 2 gets from No. 1, and which consequently No. 1 loses. If five targets be placed one behind another, and a rifle ball be fired in such a way as to pass through them all, the ball will lose part of its motion in each one of the targets. If it strike the first with the force of 25 pounds, and loses 5 pounds of its force there, it will strike the second with a force of 20 pounds. If it loses 5 pounds in passing through each one, it will be entirely spent, when it gets through the last one, and will go no further. In this case, each

target has received 5 pounds of motion in the shape of heat, and 5 pounds is the measure of the resistance of each target to the passage of the bullet.

Again, if a billiard ball No. 1 hits another, No. 2 with a force of 4 ounces, after which No. 2, rolls off three feet and No. 1, rolls 1 foot, it is apparent that at the instant of the contact, ball No. 1 lost $\frac{3}{4}$ of its force to No. 2.

Again, if we attach to a galvanic battery, a silver wire as a conductor, and pass a current through it, the conductor will offer a slight resistance to its passage, and the force of the current will be reduced by say, one per cent, 99 per cent of the energy getting through, and presenting itself for work at the further end. If now, a conductor made of bismuth, be substituted for the silver one, and the same current passed through it, 80 per cent of the energy of the current will be arrested and made away with, and only 20 per cent delivered at the further end as galvanism. The resistance of the bismuth to the passage of the current, has reduced 80 per cent of it from galvanism to heat, and this energy of heat is retained in (or between) the molecules of the bismuth, and is shown by its increase of temperature. As heat is only a mode of motion or form of energy, the amount of this motion taken up by the molecules of the bismuth, is just exactly as much as that lost from the galvanic current, and the specific resistance of bismuth, that is the resistance compared with that of silver, (100) is said to be 80. Now we see from

these examples, how resistance is essential to the transfer of motion from one body to another, and how it is an attribute of matter.

If we could imagine a body destitute of resistance, it would be a body that could not be set in motion; for it could not retard or diminish the motion of any other body. But there is probably no such body in the universe, surely we do not know of any. Obviously every body that moves or ever has moved, possesses resistance, because there is no possible way in which a body may acquire motion except by getting it away from some other body that has it. It cannot make it afresh or originate it in any possible way.

Now, to say as Huxely does, that sensation has no resistance as matter has, is only to say what can with equal propriety be predicated of every possible or conceivable motion—the **passage** of a bullet, the **flutter** of a flag, the **fall** of a stone, the **wave** of the hand, the **blow** of a fist, the **tick** of the clock. Of course the quality of resistance does not belong to any of these nor does it belong to feeling. Carefully distinguish here between the motion and the body or thing that moves. The body possesses resistance and because it does, and only because it does, it acquires motion. But the motion it acquires is not a thing or an entity, and does not possess or contain resistance or any other property or quality of matter. Consider closely the waving of a fan. While the fan moves, we say it has motion, and we call it a wave. But the wave is no **thing**, it is strictly

immaterial. The fan comes to rest; what has become of the wave? It is gone forever and there is no corpse, no remains, no pieces, to show that it had ever been. And it never will be again. The fan will still exist, and the hand will be there to set it in motion again, and another wave like the first may be produced, but that particular motion has begun, ended and ceased forever, never to be reproduced. But the energy of the moving of the fan has not been destroyed. It has been transferred to the air increasing its heat. Matter is more or less permanent and enduring, as compared with its motions. They are constantly shifting, changing, and being transferred from one body to another, each body as it receives motion from another, moving according to its own form and constitution, and no two going the same gait.

But it may be asked, if the motion of matter has no extension and no resistance, how is it that we can see it and feel it. For, if a meteor flies across the sky, do we not see its motion? do we not see its light? And if it falls to the ground and we pick it up, do we not feel its heat? And are not light and heat both modes of motion?

I will answer the questions in order. Strictly speaking motion is not seen, it is perceived. The term see is used in connection with an object in the environment, that either radiates or reflects what we call light, some of which entering the eye makes an impression there. We are said to see the object that does that. It is not the light reflected, or radiated, that we say we see.

The fact is, it is not light that is radiated or reflected, but it is a form of motion involving a mode of energy which it is ascertained consists of an undulatory or waving movement, of a rare, invisible and impalpable agent or substance called ether, which is proved to occupy not only all vacant space, but also to be continuously diffused through the intermolecular spaces of all bodies. When these waves of ether reach the eye, and propagate a nerve current thence into the brain, we have the **sensation light**, in color or white, as the case may be. So, light of whatever color, is simply a sensation of ours, and does not exist in the objective world; the antecedent and cause of such sensation being these mechanical undulations of ether, presumably bearing no resemblance to such sensation, any more than we could imagine the scratch of a pin on the finger, to be like the feeling of pain that follows it. Now it is not light that we see, nor the undulations of the ether that cause it, but the body or object from which such undulations are reflected or radiated. Light is really then a part of our mind; but from long use before the real facts were known, we still apply the term also to the antecedent motion in the objective environment that causes it. Seeing, is getting a sensation of white or color by means of these reflections or radiations, and the color that we get is only a sensation of ours, and is not a property or quality of the object seen, although from habit we ascribe color to the object, as when we say the apple is red, the sky is blue, etc.

The same observation is true in regard to heat. This term is also applied in two ways; one way, the proper one, to our sensation; the other to the cause of the sensation. Heat is identical in nature with light, being caused by slower undulations of the same ether that produces light; and we use the term heat in a double sense as we do the term light, and we improperly, by habit, ascribe hotness to the objective body from which we get the undulatory motion, as when we say the poker is hot, etc.—when the hotness is simply a feeling of ours, and is not in the poker.

Now recurring to the question: do we not see the motion of the flying meteor? The answer is we do not see the **motion** of the meteor, but we see the meteor itself; first in one place, and then in another and another; and its movement is then a matter of inference or perception, but not of simple objective sensation.

If we should see it upon the left hand edge of a cloud behind which it is instantly hid, and after a moment we should see it again at the right side of the cloud, we would infer, or perceive, that it had moved while behind the cloud, although we had no sensation from it during that time. The conditions which are necessary to produce in us a perception of the motion of a body, are, that before we forget having seen or known of it in a certain spot, we shall see it again in another place. It is the automatic comparison of these two sensations, (or elementary perceptions) that gives rise to, or consists of, the more involved

perception of the motion of the body. If, after, having seen a body we forget just where it was; when we see it again, we may be unable to say whether it has moved or not. But when a body moves while we are looking at it, there is not time to forget where it was before we see it in a different place, and so the perception of the motion is instantly and automatically formed by the interaction of the sensations we get of the body in the several different positions.

It is observed that the undulatory motions that constitute what we call light and heat in the objective world, giving rise to our corresponding sensations; are either radiated or reflected from some object in our environment, and that such undulations proceed in straight lines from such object, until they strike a body that is competent to arrest the motions or reduce their rapidity. Almost all bodies are able to do this more or less completely. Some, however, such as glass and various crystalline minerals, are transparent, allowing the motions, both heat and light, to pass through without much loss of energy. Bodies that are opaque retard the undulations, so that those of them that pass through are of a reduced pitch and slower movement, but the loss thus suffered by the rays of undulation, reappears in the gain of temperature in the obstructing body. Often a part of the energy of the undulatory ray is perverted into electricity and light rays are degraded to heat rays, while both kinds disappear in part in doing the work of expansion, etc. But when these rays strike an organized body,

animal or vegetable, the motion arrested appears partly as work, partly as electricity, partly as rise of temperature and in the case of animals and men partly as nervous energy, which last, passing inward to the ganglions of sensations, arouses there the feelings, light or color and heat.

The eye of a man or other animal, is so constructed that the light undulations entering it are stopped as such and their energy is transformed into the motion of a nerve current up the optic nerve to the brain, where it is again changed .

We get no feeling without a transfer to us of motion from the environment, and our feeling is the result and the equivalent of the motion lost by the body in the environment. If the body loses no motion we get no feeling of such motion.

Looking at a flying meteor does not retard its flight, and as shown above we get no direct sensation of such flight. But seeing a light is different. The flying meteor radiates its light in all directions. Whenever a ray of this light strikes an opaque object, it is stopped as light, or movements of ether, as shown above; the external ether suddenly becomes quiet, and its former motion goes on in the intermolecular spaces of the opaque body; the body or substance moving in such case being as I suppose the intermolecular ether. When such opaque body is the eye, the motion is converted into a nerve current, and later into a sensation. Carefully observe the difference between the two cases. If we stand in the way and check the motion we get a sensation

of it, otherwise we do not, and must ascertain the motion indirectly, by some other sort of sensations. Now let us consider what is meant by checking a motion. We well know there is no such thing as motion in the abstract—motion disconnected from substance. When there is motion, something moves and when we speak of motion it is the movement of the thing, that we mean. In a ball game the motion of the ball is stopped by stopping the ball, and the player stops it by allowing it to strike him in the least vulnerable spot, and the sting that follows catching it, is evidence that part of the arrested motion of the ball is turned into sensation. But the main point to be kept in mind is that the stoppage of the motion, is accomplished only by an actual grappling with and arrest of the body, or thing, or substance that moves. It is only when there is actual collision between two bodies, that motion is stopped in one and transferred to the other, and we cannot get at the motion of a body, unless we get at the body itself. Applying this to the problem of seeing a light, we observe that we can get a sensation of light only by grappling the objective body whose motion it is that we speak of as (objective) light; and reducing it to quiet. This body as observed, is named the ether. So when we have the sensation of light, it means that some of this moving ether has struck us in the eye, and in doing so has been brought to rest like a ball falling into the hands of the catcher. In seeing, therefore, it is not merely an abstract immaterial motion in the environment we have

to deal with, but an actual material stuff or substance. Seeing considered as a sensation is in reality feeling; and what we feel is not light, but the impact or blow upon the retina given by the moving ether. Feeling is in reality the effect of this blow, and the name of this feeling, is light.

We could see or feel the motion of the meteor in its flight only at the expense of the reduction of such motion, by forcibly detaining the body itself. But we can see or feel its light as we call it, by stopping the motion of some of the rays of ether that reach us from it.

(In order to get a sensation of color, green for example, we must look through glass from which all the colors have been cut off except green—in other words look through green glass.)

The same observations apply to the consideration of heat. Considered objectively, heat is the slower undulations of the same ether whose more rapid undulations constitute light. To get the sensation heat, we must stop some of these undulations. To do this, some of this moving ether must strike or impinge against our skin, and its motion be arrested there by such contact.

If we take hold of a warm object we shall have the sensation of warmth, and the object we handle will be found to have become cooler from our handling. If the hand be held in front of the fire till it feels warm, obviously the rapidly vibrating ether by striking against the hand, has thereby lost a portion of its motion, some of the high pitch undulations have been reduced,

the motion so lost by the ether being transferred to the hand whose temperature has thus been raised, and from which a further transfer of motion to the brain has developed there, the motion called feeling of heat, or simply, heat or warmth. Now it is plain to be seen, that when for convenience and following the custom we speak of light and heat in the objective world as modes of motion, what we really mean is that they consist of a certain kind of matter called ether in motion in a particular manner, viz.: undulatory.

The ether itself, then has both extension and resistance—its motion like all other motion, has neither.

But the same argument applies to psychic substance that applies to ether. The nerve current which is certainly physical, that is the motion of a physical body; doubtless the same ether; is stopped by the resistance of the psychic substance. In no other way could the ether affect psychic substance than to give up to it a part or the whole of its motion. In no way could psychic substance be affected by ether, or any physical body whatever, except by being set in motion by it. In no way could it be set in motion by another body except by resiting its impact. It could not have resistance unless it were itself a physical body. If it is a physical body, it can possess no other than physical properties, or be endowed with any other than physical functions.

But feeling is one of its functions, therefore,

feeling is a physical function. And every function of a physical body is a mode of motion, therefore, feeling is a mode of motion—a motion of the psyche. Like ether then as well as every physical body, the psyche has extension and resistance, properties of matter. But its function, feeling, of course, has neither. Remember the psyche is the substance that feels.

Resistance then to the impact of the sense currents on the part of the psychic substance, is essential to the production in it of feeling.

This resistance is the product of two conditions—the inertia or dead weight of the psychic substance as a mass; and its molecular tenacity, by which the passage of a current through it is resisted and arrested in part or in whole. The mass resistance expressed in C. G. S. units would probably appear a small quantity. And I take it the frictional resistance to the current at its point of delivery and entrance to the psychic matter is the more important factor of the two in the production of the feeling.

The first impulse of sensory impression that comes over any particular route and enters any particular gateway to the psyche, is stronger than subsequent ones, because the route then offers the greatest amount of resistance, and stops the greatest amount of the sensory motion, the amount thus stopped being transferred to and setting up the motion of feeling in the connected portion of the psyche. The route is made more facile, by each subsequent passage over it of the same sort of stimulations, so that the friction con-

stantly diminishes—the resistance diminishes, and the keenness of the feeling diminishes. The gate which was figuratively hard to open at first becomes more easy to swing at each impulse of incoming sensation till finally it loses its elasticity to such an extent as to be unable to close itself, and the current rushing through the open approach, arouses no sensation at all of its passage, but delivers its current to the usual motor organ that had habitually acted as its outlet. Such a chain of action as this takes place in walking. An infant learns to walk by painful and often repeated effort, and its sensibilities are constantly on the strain of earnest attention. This attention constantly diminishes, and at last the steps are taken in many cases, without consciousness of any stimulation either sensory or motor.

Habit begets facility of nerve and brain motion, by diminishing friction.

Professor Exner made numerous experiments that established the scientific value of habit, showing that nerve currents may become from two to four times as rapid by practice and habit. showing thus the diminution of friction, resistance and sensibility.

CHAPTER XIII.

Where Do We Feel

The precise nature of the motions that constitute feeling, considered objectively, is as yet largely a matter of conjecture. But the con-

ditions appear to indicate, that the feeling consists of the molecular vibration of different patches of cerebral cells, under the excitement of their stimulations, either sensory or motor, as also the stimulations arising from the interactions of the internal senses. In our waking hours, practically all of our purposive and directive thoughts, create feelings, which leave their impress upon the tissues as organs and records for future memories. The strength or force of the feelings depends upon the force of the stimulation. The same force that would, if strong, develop strong and enduring feelings, would, if feeble, hardly be attended to at all. This indicates the physical nature of the material employed in the creation of the feelings.

In the simplest animals, before the differentiation of a nervous system, all parts of the body which is necessarily minute, are more or less sensitive to stimulations of one sort only, viz.: touch, and whatever sensation it possesses must be felt where the actual contact of the touching body occurs. But other modes of force besides touch assail the little creature—light, heat, sound, etc., and after a time these develop in the body, specialized organs for seeing and hearing. No doubt the seat of the feeling in such cases, is at first in the sense organs themselves. In the further development of these senses, there comes a division of labor, and there is built up a ganglion just inside from the sense organ which takes up the function of feeling and sensation, and the office of receiving the stimulus and passing it on

to the ganglion, remains with the external organ—eye or ear. Further development does not undo this arrangement, but extends and amplifies it. In all the higher animals,—in all the vertebrates, I reckon—the feeling takes place in the psychic substance located in the brain and nervous ganglions.

But parallel with the development of external sense organs, in lower animal life, or perhaps earlier, is the development of the sympathetic nerve system, which runs the internal machinery of the animal, including the stomach and intestines.

There is pretty certainly a parallel feeling between the establishment of a stomach, and the erection of internal senses. The first internal sense, was probably in connection with the stomach. The stomach ganglion being stimulated by the condition of the stomach, produced the sense of hunger or that of satisfaction. Before the construction of the stomach, the environment of the animal was entirely outside of himself, his food getting to his tissues from the outside through the skin. Under this condition no effort was required on the part of the animal. But when his tissues came to be nourished by food taken inside, then effort on the part of the animal was essential, to fill his food receptacle, and then the first internal **conscious** sense organ involving **conscious** memory would come into play. Here is probably where **feeling** first begins, viz.: in relation to the condition of the stomach; one state of it giving a feeling of un-

satisfaction, stimulating to action, another state giving a feeling of satiety, leading to rest.

It is necessary to suppose feeling before we can have **voluntary** action.

It is extremely probable that the hunger sense at first had its seat in the stomach, and at first would consist of the entire epithelial lining of that organ, and would be a development or outgrowth, of the sense of touch, first developed in that epithelial membrane, before it was punched in from the outside and became a lining, from having been an external skin.

Later, as the internal viscera became added to the stomach, the chief ganglion of sensation, became an independent nerve center, no doubt remaining a center and seat of feeling. And for aught we know, it may be that yet. Some writers take the ground, that feeling is a function of all the nervous system, but there is no way to prove it. If a leg be amputated, we have no means of knowing whether it feels anything or not. While it was connected with us any hurt to it **we**, the collective self, felt it in the brain.

There has been much discussion of the question just **where** in the brain do we feel. Experiments have located various sensory tracts on the surface of the cerebral hemispheres. The centers of vision are found on the supra marginal lobule, and angular gyrus—on the side of the head, well back and partly in the posterior lobe. Centers of hearing are found on the superior temporo-sphenoidal convolution, mostly in the middle lobe on the side and lower part of the brain. Smell

and taste centers are found under the bottom of the hemispheres, on the exterior aspect of the uncinate gyrus, in a place inaccessible from the outside. Centers of touch sensations are found on the mesial, middle surfaces of the hemispheres, where they are separated from each other by the great longitudinal fissure of the brain (which divides the cerebrum into hemispheres) on the convolutions called gyrus fornicatus, and the gyrus hippocampi. These also are inaccessible from the outside. In passing up to these sensory regions in the cortex, a portion of the stimulations first pass through the optic thalamus or the corpora quadrigemina, or both—which organs are under the cerebrum, about the center of the skull—and a portion pass on directly to the cerebrum, without entering any other ganglion. The sensations or feelings aroused by these direct stimuli, must certainly have their seats in the cerebrum. It has been supposed by some physiologists that the optic lobes and optic thalami, are organs of sensation for such of the stimulations as enter them.

Even if this is true, however, it is reasonably certain that they are not memory organs, that is, their sensations, if they have any, cannot be revived after they have once subsided, as the memory organs in the cerebrum can. If they have sensation, it is only momentary, while the stimulation lasts. They are too small for memory organs. These ganglions are doubtless of greater relative importance to the lower animals, than to us. In our case, the organs, the restimulation of

which gives rise to the feeling of memories, without doubt are situated in the cerebrum. The same is no doubt true of at least all the mammals. But in their case there is greater reason for assigning power of feeling to their sensory ganglia—the corpora quadrigemina and optic thalamus. We find the lower mammals as a general thing considerably more acute in their senses than we are, but they have vastly fewer memories than we have. That is, they see, hear, touch, and smell very much more acutely than we do, but they see, hear and touch (at least) fewer things than we do. They remember some of their sensations quite well, but on the whole their memory is much shorter than ours, and it extends to an almost infinitely smaller number of subjects. Corresponding with these facts, the basal ganglia of these lower mammals are very much larger, relatively and the cerebral hemispheres very much smaller, than ours. Now, if the cerebrum contained the organs for primary sensation, they ought, in these lower mammals, to be larger in proportion to the basal ganglia than they are in man.

A sensory apparatus for receiving even a large number of stimulations need not be so very large as we may understand by an examination of the eye or ear. Millions of sights shake the rods and cones of the retina, and millions of sounds vibrate the arches of corti. There are 4,000 of the latter, and a million or two of the former, but of the organs thus constituted, the former occupies

an area of less than one-fourth, and the latter less than a fortieth of a square inch.

As stimulations come more or less in single file, the organs for their reception are not required to be large. They are like the doorway of a great hall, which, though small, admits the entrance of many people. The interior, to hold these people, however, must be large. So, the stimuli after passing the narrow gates in the basal ganglia, if they are to effect the differentiation of organs by which they can be re-felt in the future, must have a large and roomy receptacle, in which such organs can be stored; something like the ware-house of an organ factory. The cortex of the cerebrum is such a receptacle. In the lower animals, it is small, and their memories are few. In man it is large. In many fishes the cerebrum is smaller than the optic lobes. This shows that the fish is governed more by what he sees at the moment, than by what he remembers having seen before. The advance we have made over the lower mammals is in the cerebrum, not the basal ganglia, and correspondingly the increase in our mental functions is in our memory, not our sensibility.

The basal ganglia are in man at least, chiefly or exclusively, organs of impression, rather than sensation.

The organs in the cortex of the cerebrum, then, having been given their peculiar make-up, twist and condition; made as we might say into a multitude of little dynamos, by the play of the original stimulating nervous current, remain

silent and inactive, like any other machines, till a new stimulus, something like the first sets them in motion again. This motion is the feeling we call memory. Now, we should expect to find the location of the memory feelings severally, in the machinery that produces them, as we look for the squeak of an unoled bearing in the bearing itself.

It was once thought that the optic thalamus was the seat of all sensation or feeling; and that even the activities that take place in the cerebrum, constituting memory had to overflow down to the thalamus in order to be felt. But that view is rendered improbable, by the fact that the nerve fibres connecting the thalamus with the cerebrum, are all afferent to the latter, the stimulations all passing from the thalamus to the cortex and none the other way. Then it was also supposed that the corpora striata were bodies in connection with the organs of the cortex, and that their principal function was to consolidate the various stimulations overflowing from the cortex, and form them into a will, and it was supposed that memory of such stimulations, also constituted one of their functions. Later, however, it was discovered that there is no direct connection between the cortex and the corpora striata. The efferent fibres that leave the cortex, and pass down through the internal capsule, do not connect with the striata, but keep on down to the anterior pyramids of the medulla oblongata and thence down the spinal cord to the different muscles.

This being the case, the sensation or feeling

aroused by the formation of a will—the knowledge that a will has been formed, must have its seat in the cerebrum.

There are also a great many feelings that do not at once lead to the execution of a will. They are activities, limited entirely to the organs in the cortex, memories reflections, reminiscences, reasonings and fancies, originating by the interactions among themselves of many of these memory organs. Many of these feelings are of an exceedingly complex nature, and we feel them as we hear a band of forty pieces all playing at once. There is no evidence that in order to be felt, this activity overflows to, or influences, any organs outside of those in which it originates. When the activity ceases, its energy falls back to simple heat.

It seems quite certain that general consciousness in all vertebrates, depends on the continued integrity of the cerebrum. In many experiments in many different families, of birds, fishes, reptiles and mammals, deprivation of hemispheres always destroys memory.

A high authority on this subject is Dr. Ferrer, author of "Functions of the Brain," who thinks sensation is destroyed by loss of the cerebral hemispheres. His experiments show that a reptile, fish or bird may be deprived of its cerebral hemispheres without destroying its life, or impairing its ability to perform many acts of a reflex nature. A fish is still able to swim, and in swimming will avoid obstructions, but it will continue in a purposeless manner to swim till physi-

cally exhausted. It will not eat of itself, although if food be put into its mouth, it will be swallowed and digested. A bird deprived of its hemispheres, behaves in a similar way. It will fly when thrown up into the air, but would die of starvation before it would eat, if left to itself; yet it digests food when it is forced into its mouth; a purely reflex action. In fact no other than purely reflex actions are possible. The stimulation, if strong enough, provokes its proper action at once, since no other influence from the memory or internal sense organs is present or possible to modify, hasten, or retard it. If such stimulation were felt in the optic thalamus, it would be but a momentary sensation, disappearing the instant the stimulation stops, or a new stimulation begins. Each stimulation in its turn, sets up its accustomed activity without regard to any other, and there is no co-ordination of stimuli, and no purpose in anything done by the animal. Water in contact with the fins and tail of the fish, and air pressing upon the wings of a bird thrown into the air, constitute stimulations sufficient to set those members into resisting motion, and if there is any feeling of these actions, it cuts no figure whatever in their performance. Since the actions are reflex and purposeless, and done without friction, it is entirely improbable that any feeling is aroused by them.

We conclude, then, that the corpora quadrigemina and optic thalami, are organs that receive impressions, and that may feel for a moment the sensations of these impressions. But

the impressions leave no permanent marks in these organs by which such impressions can be revived by future restimulation. With the corpora striata, it may possibly be different, and that organ may possess some memories, both sensory and motor. But the cerebrum is pre-eminently the organ of memory. With its one or two billion cells, its storage capacity is infinitely greater than any other possible memory organ in the brain.

Notwithstanding the cerebrum and corp striatum are the principal, if not exclusive, seats of feeling, it is a singular fact that either of them may be cut, pinched or irritated directly, without suffering the slightest sensation, painful or otherwise. But when an afferent nerve is pinched, irritated, or stimulated, the same feeling is aroused that is caused by the current of such nerve when properly connected with its external sense organ. Thus to pinch the optic nerve gives a sensation of light. This shows that the brain cells are so differentiated that they are capable of only one sort of motion.

From the Times, Sunday, Feb. 13, '98, I extract the following: "Dr. Flichsig, University of Leipsic, has discovered four brain centers of intellect. He locates them as follows: in the fore part of the frontal cerebrum, in the temporal lobe, in the rear parietal lobe, and in the lobule." These complexes within the surface of the cerebrum are said to be connected, and to closely resemble each other although essentially differing from the other parts of the cerebrum. These

centers are not present in the new-born child; but when the inner development of the centers of sense is completed, after the third month, the intellectual centers begin to gradually form and move, and more nerve fibres shoot forth from the centers of sense into these new regions, ending close to one another in the cerebral cortex." These he calls "centers of association" that concentrate the activities of the organs of sense and higher units, and are the bearers of all that is called cognizance, principles and aesthetic emotions.

(The Basal Ganglia; that is the Optic Thalamus; Corpora Quadrigemnia; Corpora Striata, are all underneath the base of the cerebrum.)

It is highly probable that the feeling sense is distributed throughout the plasm that constitutes the body of the lowest animals, the protozoa, and that in the processes of the evolution of the Animal Kingdom, this sensibility became broken up and developed in detached centers. These became more sensitive at the expense of the general body and developed nerve threads connecting different parts of the body, and forming nerve knots at their crossings which in higher animals become ganglions and brain centers, which monopolize all the sensibility that is developed as the portion due the whole body.

The development of any particular sensibility, in any particular animal race, is a question divided between the demands of the external world upon the exertion of the individual, and the process of natural selection.

It is perfectly certain that the functions and machinery of sensibility are as much the subjects of development and cultivation, as the muscles.

Does not this hypothesis presuppose a general diffusion of one or more sorts of materials, that are self sensible—out of which the more developed psyche is compounded?

CHAPTER XIV.

Nervo Psychic Action

The mind differs from the psyche in the same way that a stroke differs from the stick that delivers it. Since mind is nothing but motion, it does not exist in a state of rest, and during the periods in which the psyche is at rest, there is no mind in existence. Nearly the whole of our minds vanishes every night when we go to sleep, a small part remaining on duty in directing those nerve currents that drive heart, lungs and digestive apparatus, etc., belonging to the vegetable part of our economy, which never goes to sleep.

Motor Side.

The functions of the motor side of the psyche are the reverse of those of the sensory side. The latter receive stimulations from the sense organs in the peripheral regions of the body, and generally pass them into the middle district of thought and memory, which middle district, after a certain elaboration of the stimuli, passes

them on to the motor side, from which they are forwarded, chiefly to muscles situated in the peripheral portions of the body. A few of the stimulations originate in the body, in the stomach, heart, intestines, etc., but most of them start from the skin, and the organs of smell, taste, sight and hearing. There are a few internal muscles that can be controlled from the motor side of the psyche on occasion of an extraordinary stimulation, but as a rule the internal muscles are governed from ganglions in the medulla oblongata and in the solar plexus, and other nervous centers. They are **sub centers**, and act in unconsciousness.

The ordinary course of a sensory stimulation passing into motor action may be traced approximately by an example. Suppose a boy places a finger of his right hand on a hot stove, thinking it to be cold. The heat agitates the skin, which is a sensory organ, and the agitation reaches the nearest nerve fiber, which cannot be over $\frac{1}{8}$ of an inch away. At the nerve fiber or on the way thither, a portion of the agitation is consumed in setting up a nerve current, which runs up the nerve to the sensory tract for touch sensations in the cortex of the brain, which appears to be located in the falciform lobes lying in the middle walls of the hemispheres on each side of the great longitudinal fissure that divides the hemispheres from each other.

As this stimulation starts in the **right** hand, it reaches the sensory organ of touch in the left hemisphere. It arouses an acute motion in these

sensory cells in the falciform lobe, but probably dividing there, one portion of it darts into one of the motor regions for the arm, of which there appear to be two or three, for different movements of the limb. In this case it would probably find the one lying in the middle surface of the same hemisphere a little higher and further forward than the sensory organ and only a short distance from it. From this motor tract the energy hastens on its return trip, and goes down the efferent nerve into the muscles of the right arm and the finger that is in trouble. These muscles under this motor stimulus lose no time in contracting or shortening up, by which means, the arm is jerked back, and the finger pulled away from its unpleasant contact with the stove.

It is to be observed that the finger resting on the stove, does not get away of its own accord, although while it remains it is being seriously injured, and if it should remain long enough, it would be destroyed or rendered entirely useless. Moreover, the muscles that are competent to remove it from its dangerous position, are in part in the finger itself, and are suffering themselves to be consumed, utterly powerless of themselves to do a thing. Since they feel nothing, they do not even know that there is anything wrong. The nervous current that is generated in the skin by the heat, passes up the nerve in the arm close to the biceps muscle, that is able to pull the forearm back by its contraction, but it does not influence or move it, but speeds on by to the sensory cells in the falciform lobe. The biceps

would never of itself stir to assist, if **that finger** and every other finger were to burn up. But the nerve current finds in the sensory cells of the **fulciform lobe**, stuff of a different kind, viz.: feeling stuff, a piece of the psyche. When this nerve current runs into this piece of psychic stuff, the result is a feeling and a painful feeling; something to be avoided. This feeling is in reality a motion of this psychic material. The psyche may have other motions beside this; probably it has. But, at any rate, feeling is one of its motions, aroused by the incoming stimulus from the scorching finger, and a very essential motion too, for it is at once communicated to the motor patch of cells for the arm, and by them to the efferent nerves connected with the muscles of the finger and arm, which quickly convey it down to said muscles, causing their contraction. Now, it is evident that if this painful sensation were not experienced, the stimulation would not be forwarded to the motor organs and the finger would not be retracted, but might stay there and be burnt to a coal. The feeling substance that experiences this feeling, is able to transfer to the nerves, a motion that is equivalent to the force or physical energy of the principle part of the feeling it experiences; but not quite all, for some of the physical energy of the feeling, will be lost by friction, and reduced to heat. The best machines are unable to deliver all the energy that may be exhausted in setting them in motion, the loss being turned into heat by friction. In this case the loss is probably small.

In the near future, our scientists will be able to measure the force of a feeling in C. G. S. units. It will be found to be something like the amount lost from the nerve current by friction—measurable in terms of heat.

But there is another effect due to the stimulation from the scorching finger, and that is the permanent differentiation of a portion of the psychic stuff into a memory organ or several of them, by which the circumstance of the scorching finger and all the incidents connected with it, can be refelt or remembered in the future. These memory cells are formed with a vividness proportional to the intensity of the pain. For the sake of simplicity, I have mentioned only one stimulation concerning the incident, the one that conveys the first shock of the inharmony that begets the painful feeling. In reality many stimulations must have passed up the nerves and have been received and have made their impressions in different parts of the brain. Stimulations are coming up the sensory nerves in a stream every moment. After the hand of the boy has been snatched from the stove, he will be able to tell what he was doing just before the accident; all the incidents and circumstances connected with it, and what his thoughts and feelings were. The action between the brain and the sense organs is continuous and incessant. The steady pressure of the stimulating currents is constantly impressing new forms upon portions of the feeling substance, the subsequent reagitations of which constitute the memories of the events. So in the case we are considering, a vast number of stimulations had gone for-

ward to the brain and a large number of brain cells differentiated.

Exactly what takes place when memory organs are formed is purely a subject of conjecture, our real knowledge in the matter being mostly confined to the fact that they *are* formed. And in a general way we know the locality of some classes of them.

These organs belong to the middle district to be more fully discussed further on.

What we are chiefly concerned with now is the operation of the motor organs, and the sort of energy that drives them. The immediate cause of all conscious motor action is called the will.

The sensible, or conscious, will is made up by the interaction of stimulations fresh from the environment, with restimulations of memory organs, and consists of the force of the composite or resultant sensation thus formed. Often a single sensation or stimulation from the environment is sufficient to form a will; as in the case of the boy with the burning finger. The pain in this case, felt in the sensory organs forms a motive or stimulus sufficiently strong to form a strong and active will, without any co-operation or furtherance, and in spite of any hindrance from the organs of memory. Such a case as this may be said to be almost reflex as it is certainly consciously automatic. A very important point to be noted is, however, that it is a *feeling* that forms the will and compels the action.

CHAPTER XV.

Motor Side—Will

We now come to a further examination of the activities of the motor side of the mind, and the place and function of the will. From what has appeared in the foregoing chapters on the afferent side of the mind, it should be tolerably plain that the will gets its impulse and reason for being, from the aggressive action of troubled or uneasy feelings—demanding abatement,—feelings made up from the sensory stimuli entering the brain from the afferent side.

The will is not any thing, but is a mode of motion like heat. Like heat, the term, will, has two significations. By one way of using it, will means a link of the nerve force forming a chain which begins as a sensation, then becomes a feeling, then a motor efferent energy in the movement of limbs, glands, etc. As such link, it receives the thrust and jar from the sensorium of the afferent feelings, and passes them forward down some efferent nerve. It must thus be the mode of motion of that portion of the psyche that lies between the sensorium and the efferent nerves touching the former on one side and the latter on the other, not necessarily locally, but functionally. This connection is its real business partnership.

The other aspect in which we are accustomed to view the will is historically, that is, we do

not know in advance what the will is going to do, but the acts of the will, like the acts of the other parts of our running gear, are registered in our organs of memory, so that we can recall the incidents accompanying their formation and execution, after it is all over. It is this historical will whether belonging to one's self or to another person and considered objectively, of which we commonly speak, and which is so frequently regarded as a person possessed of force irresponsibility and determination, truculent and able, a general, who marshals the forces of the soul, and is its executive and despot, dictating the conclusions of the psyche and carrying them into effect. But it is not so. The actions of the will are purely automatic, and the will itself a mere factor, neither more or less necessary than any other in the same line, but it is the last of the processes, worked out through the psyche from the incoming stimulations in the afferent side and sent forward down the efferent nerve and seeming on that account to be the immediate cause of every voluntary action, and the most important member in the line.

But the fact is, that the will is not a person or thing, but only a motion, and is made up by interactions of the psyche from the afferent stimuli, and it is made up every moment. The will is not the same for two minutes in succession, because of the constant changes of conditions by the incessant influx of fresh stimulations. The sensations creating feelings are formed before those of the motor side, so that the latter are behind

the former, the period of one delivery of nerve energy.

We cannot attend too closely to the relationship of the terms composing this line of causation, beginning in the environment, and ending in the environment, especially to the fact equally endorsed by science and philosophy that each term in the series, is directly set in motion by the term behind it, and gives motion to the term before it; that these terms are all of similar constitution and make up, going under the general title of **neuro-psychic**; or nerve-brain matter.

The material composing this organism is chiefly gray matter, called the cortex or bark, forming a coating over the entire brain and made up of cells amounting to many millions in number, all connected together by very fine nerve fibres. The brain is also connected with the organs of sensation,—eye, ear, skin, etc., by strands of nerve fibres.

The cortex, as already mentioned, is divided into numerous patches, all having functions differing in detail, some the seats of memories of various kinds, both the memories of former sensations and of former motor activities.

In making use of the word *psyche* to signify the collective organ of mental action, we must not be misled into assuming that there is but a single organ that does all the work, taking one job after another, for that is not the case. There are as many sensoriums or seats of sense as there are senses or subdivisions thereof. Each of these we are to regard as a complete machine.

It is difficult to use the word **mind** without attaching to it a wrong import. We frequently speak of the psyche as a mind forming machine, and so it is. That is, the psyche and every sensory subdivision of it is a body of educated or differentiated brain cells, which by reason of such education are subject to being put in a molecular motion of a peculiar kind by nerve currents generated by forces in the environment.

Such peculiarity is due to such previous education, and that is due to previous nerve currents from the outside.

The molecular motion so developed constitutes feeling; each different onset of nerve motion giving rise to a different feeling. Each feeling, however, subsides the moment the current stops, and is made continuous only by the rapid reiteration of the stimulating current. This motion being a molecular motion, does not extend outside of the psyche of whose molecules it is the motion.

When, therefore, we speak of the brain as a mind forming instrument, we only mean that the brain has become so differentiated or specialized, that upon being agitated again there will be reproduced in it the same motions, and these motions are in detail feelings, and collectively, mind. We see that this feeling, this quiver of molecules is a physical movement, set up by a physical force, therefore competent to do work. And as shown above, it is a vital factor in about all the work we do—work that never would be done without it. When a stimulation from the

environment reaches the psyche, it accomplishes two things; one of which is the differentiation of a portion of the psyche as an organ of the memory of that transaction, the other to create a feeling. The first creates a permanent change in the structure of the psyche or a portion of it; the last a physical motion on a strain may be relieved by nerve current to some other part of the brain, where it may reinforce or modify some other, and yield its force and influence in the formation of a will and the execution of motor activities.

The effect of long repeated sensory stimulations, is to modify the structure of the psychic organs, so that their action changes with age. As adults, under the domination of different influences from these changing organs, our actions are entirely different from those of children, and will continue to differ as we approach old age; till a time arrives when the fiber of the material, becoming infiltrated and unyielding, the organ refuses to learn anything more.

We are machines, built and operated by our environment. We do not originate or create anything. Our brains are mixers like the hollow iron globes for mixing concrete, used by builders and contractors. Into these mixers are dumped the stimulations darted and reflected from every point of the compass. The results of their interactions are thoughts, feelings. It is obvious these mental interactions cannot contain any factors not in the environment. They originally come by way of the senses, and if they give rise to states of consciousness, or metaphysical conceptions of unusual results,

we can always discern in the material environment traces of the routes taken by the several lines of sense stimulation. There is nothing that is impossible to the environment that is possible to the conceptions, nothing that is possible to the environment that is impossible to the conceptions.

In our mental machinery we can never discover as a factor, the track of anything supernatural, for the reason that supernatural things are not constituents of the environment that makes us out of itself.

CHAPTER XVI.

Location of Motor Centers

Along the fissure of Rolando, on the upper part of the head, in front of the middle, are a number of motor centers for the movement of the leg and foot, arms, legs in various complicated ways—a little forward of these positions are other centers for other motions of the hand and arm. Forward of these, well up on the side of the head, is the center for movement of head and eyes, eyelids and pupil. Below this, still in front of the fissure of Rolando are the centers for movement of muscles around the mouth. Below these still, near the lower end of the fissure of Rolando on Broca's convolution are the centers for lips and tongue in articulation. Disease in this district causes aphasia, or loss of speech. A little

below this and just within the fissure of Sylvius, is the island of Reil, the center of speech. Between the fissures of Sylvius and Rolando, near the middle of the side of the head, are centers for muscles that move the mouth in laughing.

(The fissure of Sylvius is a cleft on each side of the head dividing the frontal lobe from the middle lobe of the brain. It is a little in front of the middle. The fissure of Rolando is about half way between the fissure of Sylvius and the front end of the brain.)

Along the lower margin of the fissure of Rolando, on the ascending parietal convolution are centers for the movement of fingers and wrist.

In the medulla oblongata is a rather singular arrangement called the decussation of the anterior pyramids. The spinal cord and its enlargement where it enters the skull, called the medulla, oblongata, are each divided by a dorsal and a ventral groove, which do not quite meet each other, into two lateral halves, and each of these halves is again divided into anterior and posterior columns, the latter consisting of sensory or afferent nerve fibers, and the former of motor nerves. The forward end of the medulla swells or widens out, and the anterior columns take the name of the anterior pyramids. The decussation alluded to consists of the crossing over of the nerve fibers of the left side, to the right and those of the right side to the left. After this crossing, some of these motor nerves continue up to the corpora-striata, and others by way of the internal

capsules, pass on into the cerebrum. The effect is to place the **right** corpus striatum and the **right** cerebral hemisphere, in connection with the **left** arm, **left** leg and the left side of the body, and the left corp striatum, and left hemisphere, in connection with right side limbs and body. So when the right leg or arm is to be moved the stimulation must come from the left corp striatum or left hemisphere. As the right leg and arm and hand are much more frequently used than the left, and are much more dextrous, it might naturally be expected that the left hemisphere, as being part of the same machine, would share their more frequent use and dexterity; and this is found to be the case. In all right handed persons the left hemisphere of the cerebrum is the largest, weighing about $\frac{1}{8}$ of an ounce the most. Moreover, it is, as a rule, the seat of the motor combinations necessary in speech. The island of Reil, which is well to the front and the convolutions immediately adjacent to it, are the centers for this combination, and usually this district is functional only in the left hemisphere; not in the right except in the case of left handed people with whom it is commonly functional in the right hemisphere. There is reason to believe that as a rule, nearly all the mental functions are carried on in one hemisphere to the exclusion of the other. But some times both sides share in the functions, and sometimes they alternate—first one, then the other, and they are commonly quite different from each other. The faculty of speech goes as a rule with the more active side

of the body. In cases of Aphasia or loss of the power of articulation some reports show that fourteen times as many are due to lesions of the left hemisphere as arise from injuries to the right side. And in those cases where loss of speech arises from injury or disease in the right hemisphere, the patients are almost invariably left handed. It generally happens that if the functional island of Reil is injured permanently, the corresponding organ on the other side after a time becomes sufficiently educated to perform the function, just as the left hand can be taught to do the work of the right if the right should be cut off.

The function of the island of Reil is to combine and balance the motions of the muscles that are concerned in articulation. Each of these muscles has an independent connection with the cortex, and each one might be stimulated to perform its proper contraction by itself, but without the balancing or interaction of the different stimuli, they would not act in the concert necessary to produce a definite end. This speech organ is much like the cerebellum in its relationship to the general muscles of the limbs and body. Without the cerebellum, these muscles might act, but not in concert. They would not brace up the body and hold it against each other in counterbalanced tensions, but would jerk it about first one way and then another in an inefficient manner.

(The Cerebellum is a large brain organ lying under the posterior lobe of the cerebrum.)

There is a form of Aphasia called Agraphia, in which the patient cannot combine his muscular movements so as to form the letters in writing, although he can make any one of the movements separately, or in other combinations. There are other functions that enter into the combinations used in speech. The memory of the sounds of words is essential in spoken language, and if the center for these hearing memories located just below and back of the fissure of Sylvius should become injured, the patient would not be able to speak his ideas, yet he might be able to read from a book, using his sight memories to govern his articulation. Likewise he might be able to write while he could not speak. But if his sight memories are also cut off by injury to their centers in the angular gyrus and posterior lobe, he can neither write nor read, yet if the hearing centers were uninjured, might still be able to speak.

Injury to any of the cerebral organs destroys a memory but it does not necessarily destroy the machinery for the production of memories. And if this machinery be not injured, new memories may be built up in place of the old. This has been demonstrated in dogs and other animals in whose cerebrum certain tracts having been destroyed, certain memories are seen to have been lost. But after a time with new experiences, the animal gets a new stock of memories, and re-learns things that he knew before, but which he never would have learned again, except by such new experiences.

The same thing has also occurred in human experience through disease.

The motor organs of the cerebrum are all of the nature of the motor organs of speech, that is, they are condensing or balancing organs, reducing several simple motions to a co-operation for the accomplishment of a definite end. While the movements set up by means of the cord alone are simple and directly reflex; those performed by the cerebrum are compounded of a number of simple ones combined, and giving rise to an end no one could alone accomplish.

The activities of the cord, medulla, etc., are like the business of single individuals or simple partnerships, while those of the cerebrum may be compared to a lot of great corporations, combinations and trusts, all under a vast general government, and yet without a head. The conclusions are settled by weight in terms of force, just as if the questions before the common council were determined by the avoirdupois of the members.

The experiments of the physiologists have developed the fact that most of the motor centers of memory lie in the middle lobes of the cerebrum. The extreme frontal and posterior ends of the cerebrum do not seem to be devoted to the memories of either mere sensory impressions or of motor actions. But they are called the organs of the intellect and they are no doubt organs for the combination and recombination, the balancing and co-ordinating of all sorts of stimulations, the results of the interactions that take place in

them appearing to our consciousness as perception, imagination, reasoning, conception, association, comparison, abstraction, identification, classification, induction, judgment, generalization, analysis, synthesis, reflection, etc.

Every one of these processes upon analysis, may be seen to be nothing else than a combination, or co-ordination, of a number of sensations. A process of comparison for example, consists of the simultaneous consciousness of similar parts in two or more different objects. Reasoning is a process of analysis, by which the component, simple stimulations or sensations that go to make up a single idea, are taken apart to be considered separately; or a process of synthesis in which a number of single sensations are thrown together to produce a composite that may be considered as a single object. Such combinations of these sensory stimulations are every way comparable to the combinations of motor stimulations that take place in all the motor centers of the middle lobes of the cerebrum. In the ordinary course of action, these processes in the intellectual centers become stimuli, or modifiers of stimuli, to start the several motor acts, and provoke the motor combinations just referred to. The physiologists, in their experiments with animals, succeeded by their galvanic stimulations in causing the various motor acts to be performed; their artificial stimulations taking the place of the stimulations that naturally proceed from the environment, and receive modification and combination with the memories in these intellectual centers.

In stimulating these intellectual centers they would cause the revival of memories which would probably appear as dreams to the subject of the experiment, but might not give any outward visible sign. On the other hand it occurs to me that the stimulation of some of these centers might lead to motor acts. We know that the awakening of memories often sets up strong emotions. Some times a person dreaming of a terrible impending danger, will wake with a scream, so if the experimenting physiologist should happen to drop his electrodes on a region of such memories, he might get motor results. But that would not alone be conclusive that the function of such spot was only to produce such motor act, because under natural conditions, excitement of the same regions might lead to different motor results, or to none at all. That which would frighten a person off his guard or defenseless or ignorant of the nature of the object, might have no effect if these conditions were all different. So we are to distinguish between those centers whose constant function it is to produce a definite and constant result in some special motor combination, and those wider areas in which the combinations are inconstant and subject to perpetually changing interactions and therefore, leading to constantly varying motor activities or to none at all.

There is much evidence to show that the anterior and posterior lobes are filled with organs of intellectual combinations—and there are also such regions in the middle lobe.

In the lower vertebrates, the cerebrum has but one pair of lobes, the middle one, but neither anterior nor posterior. The lower mammals have but slight development of either the anterior or the posterior lobes, but in the more intelligent mammals some progress is made in each, and in the ape tribes, and in man, they are immensely developed. Injuries to these parts are accompanied by loss of intelligence. A dog deprived of the frontal part of the frontal lobe loses his memory of many things, and becomes stupid. If a bone is thrown to him he will run to it, but if his eyes are off from it for a moment, he forgets all about it and will not look for it. He acts from the immediate sensory stimulation, but has no reflection nor reason nor memory.

CHAPTER XVII.

Ultimate Nature of Feeling

As already observed, the nature of the motion that constitutes feeling has not been ascertained, except inferentially. Our feelings are not subject to examination objectively. Every one, presumably has feelings, but no one can examine by any scientific test whatever, the feelings of another. And yet we know nothing whatever, scientific or otherwise, except by means of our feelings. All our conscious knowledge is obtained by means of our feelings, and when we are desti-

tute of feeling, as in sleep, etc., the process of acquiring knowledge has stopped. All scientific investigation must be objective. But in the very nature of things, ones own feelings or that part with which he investigates cannot become objective to himself, except as shown further on. For we know nothing of anything except from the feeling that its motion or a stimulation of some kind from it gives us. For example, we know nothing of a star, unless radiant energy darted from it strikes our retina and arouses in the brain a feeling of light, etc., etc.

Now, we cannot examine a feeling of our own in that way, for if we could, it would mean that one feeling could dart motion of some kind upon some internal sense organ and arouse there a feeling. But the presumption would be that if we were to learn anything about the first feeling by means of the second feeling, it could only mean that the second one was just like the first, and so no progress was made. As feeling is the only and ultimate instrument of investigation and also, the ultimate object of the investigation, when we have got a final feeling of any objective thing, that is when we have felt it all over, this final feeling is the end of our knowledge concerning that thing. To prosecute the investigation of the feeling further is only to cause the feeling under examination to reproduce itself. And further than this we can never get. We can re-feel and refeel, and we do every time we awaken a memory. But that is the end of our knowledge of a feeling in ourselves.

So it is obvious that by introspection we cannot arrive at the nature of a feeling. All we can arrive at is the feeling itself—over again.

When we wish to examine a feeling objectively, we must select the feeling of another person for investigation. Now, to get a knowledge of another person's feeling, we must pursue the same process that is necessary to get a knowledge of any other object. We must get a reflection of force from such object in such a way that such force assails some one of our sense organs and arouses a feeling in us. Thus, if a cabinet maker wishes to know whether the board, he is sandpapering is sufficiently smooth, he rubs his fingers over it and gets a feeling of smoothness, in his feeling substance. Precisely so if he is to get an idea of the feeling of another person. He must get a reflection of force from the apparatus that has produced the feeling, the continuation of which is sought, of such a nature that it will strike through some of his own sense organs and arouse a feeling in his own feeling apparatus. Can that be done? To a certain extent it can. We have through long observation discovered that the feelings express themselves through the muscles, contracting or loosening certain ones in various parts of the body and brain, and imparting to the face and other parts, peculiar appearances, attitudes and actions, that we have learned, accompany certain feelings. Then there is the faculty of speech by which one may describe his feelings to an inquirer, and lastly, the telepathic wireless sense (if there be such a sense, by which

there may be such a silent influence exerted by one person's feeling apparatus upon that of another, across the ether filled space separating them, that the percipient experiences such feelings as those of the agent are able to set up in his feeling apparatus presumably similar—but not certainly so.

At any rate, the final factor in the investigation, is the **feeling** of the percipient or investigator. He may, and in the interest of truth, ought to check, compare and verify the feeling he is made, to experience, by other feelings aroused by other modes of communication between the agent and himself, etc.

The feelings produce pathological effects, as already observed. See the instances of mother's milk poisoned by rage, also cases of hair turned white by terror and cases of death by the imagination of the victim, made to believe he was being executed according to law.

All these things prove the **physical** affiliations and nature of the feelings.

But the foregoing helps us only to a more or less accurate idea of the feeling of another in terms of our own. The intimate mechanical structure of the feeling apparatus cannot be clearly detailed although it can be proved to be material, in the most positive and satisfactory manner. It is as certainly the motion of a substance as that heat and light are the motion of the substance ether.

While we do not yet know specifically how a quiver of the psyche constitutes feeling, it must

be conceded that by introspection we can learn much of the character and subject of our feelings. It seems certain that some parts of the psyche gain impressions from other parts. The brain is a republic, each part influenced by, and subject to the collective whole. In the council of the internal senses which holds its sessions perennially when not asleep, all feelings and their products in finished and unfinished thought, are weighed and measured and every one automatically drifts into its place of least resistance, and greatest effect. So it is certain that our advanced thoughts and many of those not advanced are acquainted with each other. But this, as said before, only establishes the fact of the feelings, and proves the agency of the psyche in their production, and development; but *what* the molecular vibration that produces these results actually is, remains beyond our ken. After all, it is no more of a mystery than gravity.

The weight of the whole brain in adult man runs from 40 to 60 ounces; in woman from 36 to 50. The maximum of a healthy brain is about 64 ounces; the minimum 31 ounces. Idiots sometimes run as low as 16 ounces.

In a brain weighing 51 ounces, about the average of an adult male, the weights of the subdivisions would be about as follows: Cerebrum $42\frac{1}{2}$; cerebellum $5\frac{1}{4}$; medulla oblongata, optic thalami and corpora striata, altogether, $3\frac{1}{4}$ ounces. The spinal cord would weigh about $1\frac{3}{4}$ ounces. The brain equals about one thirty-seventh of the whole man. (Carpenter.)

The average weight of a horse's brain is 22.9 ounces, and of the spinal cord 10.1 ounces. The brain of the ass weighs 12.7 ounces; and the spinal cord 5.3 ounces; that of the ox 16.9 ounces; the spinal cord 7.8 ounces.

The demand for brains for the individuals of the same race is commonly in proportion to the size of the body; a small man needs less force to keep him going than a large one; as mechanically it should.

CHAPTER XVIII.

Psychic Function Automatic.

The term automatic was first used to express the character of the actions of the cerebellum, as contrasted with those of the cord. But it must not be inferred from this that other parts of the psychic machinery are not automatic. They are all automatic. An automatic machine, is not one that runs itself, that is, that furnishes its own motive power, but one whose several parts limit, alter and re-direct the movements of each other. If a boy throws his ball again a brick wall, it rebounds. The wall is a simple reflex machine, that stands in the way of the moving ball, and by its resistance re-directs its motion. It furnishes no motion or force to the ball; on the contrary consumes a portion the ball had.

A steam engine is an illustration of an automatic machine. It is moved by the simple ex-

pansive force of the steam. It furnishes no part of this force, but on the contrary, by its friction, consumes a large amount of it. The steam shoves the piston toward one end of the cylinder, and if not restrained would drive it through and knock out the cylinder-head. But the shaft crank to which the piston rod is attached, prevents it from going beyond a certain point, while the slide valve, opened at the proper instant, by the eccentric on the revolving shaft, turns the pressing steam into the space behind the piston, and drives it back again. Another part of the engine called the governor, is attached to the machinery, and is so contrived that when it revolves too rapidly, a pair of heavy balls hung on levers fly outward by their centrifugal force, and move a valve that closes the throttle admitting steam to the cylinder, and so reduces the speed to a proper rate. So the direct force of the steam, which, unregulated, would smash everything to pieces, is caused by the mutual restrictions and restraints the movements of the different parts put upon each other, to work toward an intelligent and definite end. Human ingenuity has contrived thousands of such automatic machines, such as power presses, nail machines, screw machines, lathes, planers, saw mills, sewing machines, dynamos, etc., etc. But none of them quite equal in complexity and ingenuity those organic machines unpurposely invented by nature, that creep, and fly, and walk, and handle, and talk, and eat, and think, and feel.

An automatic machine is really a compound

machine or a combination of simple machines, machines within machines;—such is the human organism. As a whole, and in each part, it is automatic, the parts mutually inter-regulative. Every part of this complicated machine that is composed of still smaller parts, is an automatic machine. So the cerebellum, an organ for balancing the muscles, and holding the body up, whose reactions are limited and governed by its mutual parts is automatic, and so in a yet more pronounced and emphatic way are the movements of the cerebrum. The adjustments and mutual support of the muscles, in balancing and moving the body are wonderfully beautiful and complicated, and so we must conceive the interactions of psychic motions in the cerebellum that are their direct causes, to be likewise complicated. But the motions of the cerebrum in the production of thought, while not less mechanical, are infinitely more involved and complex. Instead of there being a single form of energy, there are many that must balance, modify, counteract, reinforce and consolidate with each other in such a multitude of different ways as to baffle the imagination. It is quite possible to conceive these interactions as being automatic, as limiting each other by their various collisions. It is impossible, indeed, to conceive them as instigated or developed by a purpose, any more than to imagine as purposive the apparently chance arrangement of the crystals in a kaleidoscope when they fall together as the instrument is rolled over. There is no chance about either event. Each is

an example of the competition and mutual struggle of forces, and its outcome is the resultant of their interactions. The automatic action of the cerebrum in the production of **thought**, is understood and commonly admitted to be mechanical. It is the motion feeling that puzzles the metaphysicians, and they try to get rid of it by placing it outside of the domain of physics, and have invented for it the impossible hypothesis of an immaterial substance.

CHAPTER XIX.

States of Consciousness.

Every single feeling is momentary and transitory, but a continuity of feeling, is brought about and maintained, by the incessant restimulation of an organ. The moment, the feeling created in an organ by a wave of stimulation, begins to let itself down and disappear another wave dashes in and re-erects the organ by a fresh impulse and creates another feeling and so on. The rapid succession of these feelings, all alike, gives the effect of a continuous feeling, or "state of consciousness" as it is called. A state of consciousness obviously depends for its continuity on the constancy of the conditions in the environment of the organ, from which its stimulation comes. If these conditions fail, instantly the feelings they set up, fail. Suppose for example, a person is listening to the ringing of a bell. The first stroke of the clapper

causes a feeling or sensation peculiar to itself. If it were not repeated the feeling would last but a moment and then die out. This will be disputed, for many people imagine that having once had a feeling they continue to retain it. This is a mistake, for the feeling being a motion of an organ of the psyche it can endure only as long as the motion is kept up, while the exciting cause lasts, and in the case of the single stroke of a bell clapper this is only the fraction of a second. As sound consists of a series of pulsations at various rates from sixteen to several thousand per second, the hearing of a single stroke of the clapper implies the delivery of a great number of pulsations to the ear, which are forwarded in to the psyche by the auditory nerve. They come in so fast that they cannot be separated, but pile on top of each other as they dash upon the psychic material, erecting there a new organ and creating in it a feeling of only one sound. When this ends, the **feeling** quickly disappears, that is the **strain** imposed on the organ by the incoming stimulus, quickly relieves itself, by becoming some other form of motion, as heat perhaps, and this part of the psyche is at rest. Rest and feeling are opposite states, so while it is at rest there is no feeling of hearing the bell or of ever having heard it. But any sort of stimulation that afterwards by overflowing into that organ stimulates it, puts upon it the same sort of strain that it was left in, by the force that first constructed it, but the strain will be much weaker and fainter, and this is the motion or strain that constitutes mem-

ory. So, as long as the differentiation of the organ lasts we have the **apparatus**, by which the memory of the stroke of the bell-clapper can be revived, but we do not possess it or any other feeling all the time.

So much for a single sensation of the sound of the bell clapper. But a single sensation is not a state of consciousness. To have that, the bell must sound again and again with so small an interval between the strokes that before the vibrations of one stroke quite lose their effect, another stroke shall be heard. If no other activity is present to distract the attention, the monotonous repetition of the stimulations will keep up the strain in the psychic organ so that the feeling is continuous. After awhile however, the organ is tired out. That means that the organ loses by wear and tear a portion of its substance and can no longer be stimulated. For its action like the action of muscles, is exhaustive of tissue. The repair of this exhaustion is effected by the supply to the exhausted tissues, of new material carried to them in the blood, which new material is furnished to the blood by the food we eat. Now if the waste is more rapid than the repair, the organ becomes at last too exhausted to feel, that is, to be moved. While, however, it remains in condition to respond to the continuous stimulus, and does so, the effect is called a state of consciousness. If a person glances at a red brick, he experiences a red sensation, the shape of the brick; but if he continues to gaze at it for a long time, he gets a succession of waves of force

from the brick, coming with such rapidity that the receiving organ, is kept on a continuous strain, and has no time to begin to unwind or relieve its tension. Consequently the continued sensation of red does not appear broken by intervals, as the bell sounds do, but it is solid and continuous without break. It is likewise a state of consciousness. It would seem unlikely that tissue would be consumed merely in looking at a red brick, but it can be proved by experiment that it is. If a person will look steadily at a red brick for a time, and then suddenly transfer his vision to a white wall, he will see on the wall a green spot the size of the brick and all around it white.

To understand this, it must first be explained that, as mentioned above, the retina of the eye is covered by a great number of color organs, called rods and cones. Some of these are competent to be affected by one color and some by another and so on. The compound sensation of all of them at once is white. By looking at the brick, all the organs for seeing red, that are covered by its image become fatigued so that when the sight is directed to the white wall, these red organs fail to see anything while the unfatigued organs see all the rest of the white color **except** the red on such spot, on which they see the complement of the red, viz.: green. This proves the wearing nature upon living tissue of only a beam of light. The wear in this case is said to be on the rods and cones of the retina, but these can hardly be supposed to be more delicate than the receiving organs of the psyche, and it is not im-

probable that these receiving organs share fatigue and rest with the organs of the retina, since they are connected together as one machine, with functions depending upon the integrity of both. That the activities of the psyche are wearing upon its tissues, is proved by the further fact that the brain which is composed so largely of psychic material, as mentioned elsewhere, consumes about one-fifth of the blood, while it weighs only about one-thirty-seventh of the whole body. Brain tissue, therefore, consumes nine times as much blood as the same weight of the general average of the other organs of the body. Thus the activities of the psyche, of apparently so mild, quiet and mysterious a character, are very expensive to operate. The psyche is the official department of the whole organism, and like the official departments of all other sorts of organizations, it draws the highest salary. But in this case it earns it. No executive department is more industriously worked. If there is no objective work for it to do, in the movement of muscles, and in stimulating bodily activity, it is made to work on itself in subjective operations, which are even more costly perhaps, than the objective ones. This wear and tear on the psychic matter by use proves completely its mechanical nature, and would be conclusive, if there were no other proofs.

The examples I have given of states of consciousness are of the simplest sort—simple sensations made continuous. Most of our states of consciousness, are of a more complicated nature. Generally while touched off or instigated by im-

mediate stimulations from the environment, they do not stop with the sensations set up by them, but the influence of the stimulation overflows to memory organs agitating them here and there in an apparently incoherent and aimless way, or agitating them in classes, and related areas, so that the feelings aroused are of a more or less homogeneous nature, relating to definite subjects and more or less constant and persistent for a time. The condition of the organs as to their mobility and limberness—the ease with which they can be stimulated and set to feeling, has much to do with the character of the state of consciousness. For, those organs that have been much used and go easily, are more apt to be set off by the diffusing stimulations, than those that are rusty. So that when the incoming stimuli are not of an unusual nature, there is apt to be a sameness in the states of consciousness of an individual. He gets into ruts as we say, thinks over the same thoughts, feels over the same griefs, vexations, and pleasures, the same views in politics, the same dogmas in religion, etc.

One feeling constitutes consciousness, but because one feeling endures but for a moment, it is not a state of consciousness, such a term implying continuity or duration. But a state of consciousness is by no means a state of rest or inactivity.

CHAPTER XX.

Internal Senses.

The **internal sense** organs are of two varieties; those of the primary class registering simple sensory feelings, feelings aroused by simple acts, and the second class registering memories of the interactions of these simple memories, and the erection of organs for the preservation of the memories of the principles reached, as the end of such interactions. These principles become factors in the regulation of future actions, each principle acting as a large unit, although possibly composed of many small unit feelings.

A Principle must constitute either the feeling of a single organ, or the simultaneous feeling of a number of organs. If it is the former, then it must originate by the interaction of a number of organs of the primary class, the result of such interaction becoming sufficiently strong to form a current, and differentiate a new organ in the same way that a new sensory impression from the environment does. If it does not do this, then the establishment of a principle means that the interactions of the feelings out of which it has been compounded have been made facile by frequent repetition, and the organs concerned having been often restimulated in association by a common stimulation, have become organized, so that, when any one is restimulated, the excitement flows around the circuit of this (subor-

dinate) organization, and each member is made to utter its memory simultaneously, the resultant of which is the principle of the organization. Each member of the organization is a complete unit with a single definite function while it is a component member of a larger unit with a compound yet definite function. We certainly have a great many principles in this condition of development. Most of the principles that arise as the results of our own experience must be in that condition, because we are able to analyze them, and tell just what definite feelings have entered into their composition. But on the other hand, we have many rules, signs and maxims that have originated with ourselves, the original composition of which we have lost. It seems as if the frequent practice of such principles in such cases has differentiated anew, such organs as by their re-composition reproduce the principle. For example, suppose we have a principle founded on three reasons, that is three experiences. We practice upon this principle a few times while we remember the bases of it, but after a while we forget the bases of the principle, but remember the practice of it. The practice of it, that is, has made its sensory impression upon us, and differentiated organs for itself, just as any other objective stimulation would do, because seeing or feeling our own actions as already pointed out, is an objective operation, as much as to see those of another. By this indirect process, then, the feeling and memory of a principle might become substituted for the memory of the reasons for it, even if the principle were established from our own experience. But if we have profited by the experi-

ence of other people, as much as we should do, by far the greater part of our principles have been furnished us ready made. As a rule they come to us, unaccompanied by the history of their origin. Thus we have a principle handed down from M, who saw A steal a sheep from B. B discovered the theft, pursued the thief with a club, smote him till he died, and recovered his property. In view of this tragical and lamentable result of the act of stealing, the society formulated the law, "thou shalt not steal." The law has come down to us in that language, but the reasons for it, the feelings that caused it have not been transmitted with it, and it stands a unit feeling the same to us as an original sensory stimulation. Such a law as this would speedily construct itself if it were forgotten. But we have many customs that most people who practice them have lost, or never knew the original meaning of, nor have we any reason for their continuance, except custom. Why, for example, does a bishop wear a miter? Why do the farmers in Ireland with their women and children and four-footed beasts pass through and between bonfires on Saint John's day?

Why must boys cut up in an outrageous manner and destroy property on hallowe'en? Why should people play practical jokes on each other, on the first of April? Why do the three or four thousand words that we use in our daily business mean just what they do? Why should a man be thought dressed up when he has on a plug hat and a black swallow-tail coat? Why should the cross from a period long antedating the Christian era and up to the present have been considered a sacred religious

emblem? Why should seven be considered a holy number? Why is thirteen an unlucky number?

Antiquarians might dig up reasons for some of these customs and usages, that were once valid, but of the people who now practice them not one in fifty knows any reason for their observance except tradition and instruction. Our environment is not merely our creator and supporter, but our governor, our master and our tyrant, every moment of our existence. Art is a subdivision of nature, and our own race is a part of our natural environment. And it is a most important part; with which we are in the closest and most intimate relations.

On the other hand note the persistence of functionless parts, coccyx, appendix, etc. Heredity and new use are antagonistic forces. Heredity is persistent and obstinate and therefore hard to be subverted or educated. It is in appearance only and not in reality, that as our actions become more involved and complicated, they seem to be independent of environmental stimulations. The fact is, the environment is taken inside of us. Our internal sense organs are practically the organs of unassimilated, or partly unassimilated stimuli. They are the organs of sensations that have been experienced, but most of which may not have proceeded to the production of motor results. For example, a person sees in the paper an advertisement of an article of common use, but which at the time he does not need. Some time later he needs the article, and then he remembers that he can get it at the place advertised, and acts accordingly.

In common language we say the fact or knowledge has been in the man's mind ever since he read the advertisement. There are two conditions essential to his going for the article; one is that he needs it, and the other that he knows where to get it. If the need and the knowledge both came upon him at the same instant we would not hesitate in assigning both of them to stimuli coming from the environment. But in this example, and in most cases in our experience, all of the stimuli upon which a given action depends are not introduced at the same instant. A part came at one time and a part at another. Thus the knowledge of where the thing can be procured is not of itself sufficient to make the man go after it. But it is a part of his environment, introduced to his brain, and for the time being has no force or influence upon the action of the man. But when an additional stimulation of the need of the article is added to it, the two together get up a motor action on his part to go for it. But the case may be much more complicated, and several more stimulations of sense organs arising from other conditions in the man's environment may be necessary before a final motor movement can be made. Perhaps he has not the money to buy the article, and must wait till a man who owes him some money pays up. Then, this being settled, perhaps the man is sick or lame and cannot go himself, but must send some one else. So he must wait till such person turns up. Now, during these pauses, the forces of the first stimulations remain as possibilities, but inactive, until

all the rest of the necessary conditions have become present, when they all become active in concert, and the action is performed. The fact that the several stimulations are introduced from the environment in the first place, must not be lost sight of, and they are truly a part of the environment although they are inside of the man, and have been or may be for days or years, before they become operative in the production of motor action. These environing stimulations of whatever sort, giving rise to sensations of a corresponding nature, erect in the brain such organs, or create there such differentiations, of brain tissue that when, from any new stimulation, these tissues are again set in motion, they give a repetition of the sensations that went along with their differentiation in the first place; an act that in common language we call *reviving the memory*; and the sense cells competent to be thus restimulated to revive memories we call the **organs of the internal senses**. These organs are as much bodily parts as are the eye, ear, skin, and other external organs of sense, and like them are subject to be set in motion or rendered functional only, by a stimulus from the environment. But while the external sense organs are inherited from our ancestors, and are alike or similar in number and function, in all individuals, the internal sense organs are constructed by our environment and differ in different individuals, in number, quality and function as much as the environment, sensations, actions, and experiences, of one individual differ from those of another. Our

internal environment is very largely the environment of the past.

There is a parallel between the erection inside of us of organs of sense by which certain influences of the environment may be rendered possible of renewal in future, after the external conditions and stimulations by which they were established have long ceased and disappeared; and the construction inside of us of a receptacle for food in the shape of a stomach. In the lowest animal stage there is no stomach. The animal lives in water or a moist place, and its food is outside of and around it, and is absorbed through the skin. This dependence is precarious. The animal is helpless, and the subject of the merest chance. It may get food or it may not. Food may be near, and yet not in contact with it, or it may press close one moment and be swept away the next, before the animal has been able to absorb a square meal. Its digestive apparatus is related to the environment, in the same way that its nervous system is; which is directly reflex, subject every moment to the immediate stimulation of the environment for that moment. The earliest ancestors of all the animal races, were once in that stage; But later they arrived at a time, when a dent or depression was effected upon one side of the animal, by which a part of the outer skin became an inner skin or lining. Into this dent or depression, food particles would be detained, as in an eddy, or bay, and the animal get a better opportunity for absorbing its nutriment. Natural selection by gradually deepening this dent, finally made it into a bag as

in the hydropolyte. When a good supply of food comes near the entrance to this bag, it is whirled into it by the movement of little paddles that fringe the mouth of the bag. The little animal makes sure of that part of its environment, so necessary to its existence as its food, by taking it inside of him. There it can at its leisure, extract all that is of any value. Although the stomach or absorbing skin through which it gets its nutriment, is now inside of the animal, it is evident that it is still in contact with the environment that it needs, and in better and more secure contact than when it was on the outside of the body. Just so it is that the development of the organs of the internal senses has put man and all the higher animals in better sensory contact with the environment than they could otherwise be. Without the internal senses we should be subject to the sensory stimulation of only a single stimulus coming through a single external sense-organ at a time and such stimulus being unaided, unaccompanied, unmodified and unopposed by any other, the motor action resulting, could never rise above the simple reflex. There would be no such thing as judgment, reasoning or imagination, these processes involving the interaction of several, or many, stimuli at one time. As we are assailed every moment by the stimulations from the environment, the effects of which remain impressed upon our cortical tissues, and liable at any moment upon proper stimulation to become active in conjunction with each other, to the number of dozens or even hundreds, the resulting

sensory action impressed upon the consciousness is in reality the same as if that number of direct stimuli were fired upon us, from the external environment at one instant. And we have the influence not merely of the single impression possible at this instant, but the impressions of the instants, the minutes, the hours, days and years gone before. Our environment stored away in our internal sense organs, is not merely a minute segment of the present, but likewise all the past that we ever experienced.

When a person has accumulated a skull full of internal sense organs, to a superficial observer, he appears to have become independent of his environment. When Bunyan was shut up in prison for years, he wrote the *Pilgrim's Progress*. Under like conditions, Sir Walter Raleigh wrote a history of the world, and Thomas Paine produced the *Age of Reason*. These men were no less dependent upon environment then than ever they were. The stimulation to write was furnished by their then present environment, while the greater part of the stimuli that settled **what** they should write, and **how** they should write it, were furnished by their past environments, preserved and pickled in their internal senses. We very often mislead ourselves and others by the language we use—language that does not express exact truth but only our interpretation of a superficial aspect of it. Thus we sometimes hear ministers and other superficial speakers declare that a man may rise above his environment, and in fact create his environment, and make it what

he wants it to be, alter circumstance to suit him and to be their creator instead of their creature.

It is indeed not improper to speak of the internal sense organs as part of the man provided we do not lose sight of the fact that the environments of the past have made them a part of him. A man is subject every moment of his life, for every action he performs, to stimulations from his environments, those of the past registered in the internal sense organs as well as those of the present moment; and his action for any moment is dictated and determined for that moment by the preponderance of stimulation. Now, if the greater number and force of stimulations come from the present environment, that is, if, as we commonly express it, his motives are immediate and apparent, we can see the obligation he is under to do as he does. If he does something wrong under such conditions, we excuse or extenuate the action, because we admit the compulsion of the conditions. But if the stimulations that govern the man's action are chiefly those of his past environments, which, though registered in his internal sense organs, and as real and potent to him as those of today, are still invisible to us; we say the man's action originates with himself and give him blame or credit as the case may be. It is when these invisible preserved stimulations are powerful enough to overpower those of the present, and dictate the motor action of the man, that he appears to the superficial observer to be propelling himself, and to be superior to motives, and able to control his conditions. The fact is,

that the strong stimulations of the past, control weak ones of the present.

The greater the brain capacity, and the more varied the experience, the greater the force of the environments of the past, and the more independent of the present the individual will appear to be.

No man has made himself or any part of himself—his internal sense organs no more than his eye, ear or hand. He is no more responsible for faulty internal sense organs, and oblique internal sense stimulations, than for crossed eyes, or a supernumerary finger or a present stimulation. From the various interactions of the formative stimulations from the environment, in the erection of the internal sense organs, there result certain general aspects, that are called, collectively, character. Thus a man may be civilized or savage, benevolent or cruel, gentle or fierce, etc. This character, while it largely indicates the sort of action that will result from a given stimulation, still does not disturb the fact that the organism is a machine, even though built so as to exhibit a character. The same stimulation will get a very different action from a benevolent man, than from a cruel one. Yet neither is responsible for the character that the forces in the environments of his ancestors, and in his own environments, in his past life, have imposed upon him, and used in his construction. There is in fact, no responsibility anywhere, for while he is a machine, so are the agencies that built him up through his internal senses and gave him char-

acter, and so are the agencies in his present environment, that operate him for all they find in him.

It is certainly true that memories of past experience do enter among the factors that govern our present action. If the pursuit of a certain line of conduct sometime in the past, ended in disaster, the memory of that when aroused, will certainly have a restraining effect against a repetition of the same conduct. The character of caution may be cultivated by such experience and we may observe of one who has been thus affected, that his character has changed, and that he has become more cautious. Now we are to distinguish between character and the sensation arising from stimulation. The former is the machinery, the latter the motive power. It is the motive power exhibited in the stimulus that comes from the environment that is to be regarded as the policeman urging us to "move on." Whatever responsibility we owe, is due to this policeman and his club. Motives that do not compel us are not motives at all. The responsibility then is reflected from the policeman back to ourselves, and the motive is simply, **how much can we stand?**

It is evident that the form of government that prevails in our cerebrum, is not a monarchy, but a republic, the membership of which constitutes the whole assembly of the internal senses. Harmonizing each incoming sensation, with the stock already on hand through the action of the nervous and vascular systems, is the immediate and constantly recurring office of this general assembly. No doubt there is a power of "inhibition," derived from the

automatic assimilations, and adjustments set up momentarily by which the most outrageously inharmonious factors can be disconnected, and "inhibited" from the rest. This possibility of inhibition accounts for the power of introspection, or self-study, possessed in greater or less degree by all. The phenomena of inhibition are common in hypnotism and the double ego. They depend on a stoppage of the blood supply by a nervous spasm, whereby a blood vessel is temporarily pinched together, and the blood supply closed to the parts of the brain, beyond the obstruction. All that part is, therefore, suddenly put to sleep, while the rest becomes the whole ego temporarily. This separation may cut off half, two-thirds, or nine-tenths of the whole, and the two fractions thus formed be temporarily two persons, entirely unknown to each other. This bifurcated activity is automatic. It proceeds constantly while we are in the waking state. Whatever we do that requires **attention**, especially exclusive and earnest attention, takes to itself an undue share of the blood, making two persons, the one attentive and alert, the other passive and semi-unconscious.

When we speak of the psyche, we do not mean an automatic governor having intelligence and the air of a dictator, but an assemblage of simple scattered intelligences, the aggregate of which constitutes the Ego.

If one tries to think what it is that constitutes his personality,—his self, he goes back in memory, automatically rousing one after another of his sleeping internal senses, and he feels himself to be the person who was, and did and suffered the things, his

memory recalls, and he settles that he was the kind of a man to whom things would happen as they did, and he forms an opinion of that kind of a person, and reprehends or congratulates himself accordingly. As long as he is sane he will make no mistake as to his identity—will not imagine himself to be a personage whose ego or psyche or internal senses would all be different,—as a president, or prophet, or a savior.

It has not unfrequently happened that some accident has caused a partition to be made in the internal senses, in such a way as to practically produce two persons. In our ordinary experiences our sensory stimulations appear to become automatically classified, and sensations of any given class terminate in the differentiation of cells in clusters, or patches, in particular parts, as the sight cells, on the sides of the cerebrum well up and back, hearing cells on the sides of the cerebrum about the middle and low down, etc. The nourishing blood is required in this differentiation, and if by any accident, such as a spasm or tetanus of the blood vessel leading to such patch, it is prevented from delivering the necessary material, there is reason to believe that the stimulation, and the flow of blood, will take a new track, and form another patch of cells of the same nature, but in an entirely different place, and entirely insulated from the common and usual patch. So that when the usual memories of this particular class of sensations is restimulated, the new patch is not included, and it is only when the spasm is repeated, and the old patch is closed that the subject remembers the sensations belonging to the new patch.

This alternate shifting may involve the two hemispheres, so that for a term of months or even years, the subject may live with the memories stored in the left hemisphere, then suddenly forget all these and commence consciousness with those that belong to the right hemisphere. When in one state the subject has no knowledge whatever of the things that transpired when he was in the other state.

Every night when the psyche sleeps, and its activities cease, the mind, as already shown, is temporarily wiped out; because it is the activities of the psyche that constitute the mind, and when it is at rest the mind ceases, just as electricity ceases when the dynamo stops. But the psyche wakes up again refreshed, and renewed, in part, its activities recommence, and we perceive the mind in the brightened eyes and the alert postures and movements. The psyche is subjected in old age to a gradual wearing out, like every other machine, natural or artificial. Man's mental powers fade away, as one memory after another disappears, and it is an indication that the psyche is being gradually sloughed off or atrophied, in reality dying piecemeal. The personality of the psyche is maintained by the memory, by which past events are kept in connection with the present. All the new experiences are assimilated and digested by the accumulated body of the old ones, such accretion and assimilation gradually changing the personality, which expresses itself through the outward physical appearance, informing observers in a general way of the state of the psyche. But I have mentioned above how two or more independent persons may grow side by side in the same

brain, simply by the insulation of one or more sets of experiences from the others. See cases of Mollie Fancher, Mary Reynolds, etc. It is shown that if any malady prevents the usual differentiation of psychic tissue, to the office of the assimilation of the incoming stimuli, they will take a new track, and build elsewhere, and the force of the environment will press itself upon such psychic material as happens in its way, and build a separate person in the same brain, or even half a dozen, as in the case of Mollie Fancher. But if the person is in health, the stimuli sent in by the energies in the environment, will differentiate psychic stuff to stand in relationship to the general person, and add to his mental growth and capacity, thus building a single great ego instead of two or more partial and incomplete ones. A double ego is simply a malformation, like a sixth toe.

The process of absorbing materials and motion from the environment may result in growth or increase to the organism as it already stands, provided the new materials can be assimilated, or digested and incorporated; or if they cannot be incorporated, they form another person, of the materials left over unincorporated with the old person. If these fragmentary materials are not assimilated and incorporated, this new person may grow alongside of the old person like an inharmonious twin. If strong enough it may subvert such portions of the old person as it differs with, and incorporate itself with the old.

CHAPTER XXI

Pleasure and Pain

As shown in the last chapter, the pursuit of an education is a process of creating in the psyche an internal environment or internal senses. The process consists in the establishment of memory organs, embracing memories of such qualities, characters and dispositions as are thought best by those having our education in charge, to serve chiefly as principles in the future acquirement of more knowledge, and in the government of the future conduct of our lives.

The best time for getting this education is by common consent the period of adolescence. Our mental acquirements at that period are more easily grounded, and more tenaciously retained, than those of any other time of life. This applies whether the education has been acquired in the college or on the streets. Of course, education and the erection of internal senses do not stop with adolescence, but keep on during life. But during the educational period, the subject is under the direction and domination of teachers, preachers, professors and priests, to whom his helpless age compels him to listen, and whose dicta his inexperience and even his early cultivated prejudices in their favor, disqualify him for calling in question.

At the end of this term, when the subject takes the business of his life in his own hands, these in-

ternal senses of his, furnish him most of the principles, moral, commercial, religious, political and philosophical, and not a few of the facts in science and history.

Whenever an agitation from a sense organ reaches the sensorium, its disturbance is automatically conveyed to the internal sense-organs already established.

If it finds any such that are pitched to vibrate in the same key in harmonious measure, they coalesce and the first-formed organ is reinforced by the last, and the result is harmonious and pleasing, and results in a growth of the personality. But if the pitch is in the same key, but in discordant measure, the result is repelling, inharmonious, wearing and destructive and of course, painful and disagreeable.

We learn in early life many so called truths, and many alleged facts, many habits, customs, likes and dislikes, that by the tests of more mature experience are found wanting. To have these old established conditions contradicted and subverted, is like tearing ones life to pieces and rebuilding it. It is a painful operation. But it has to be submitted to, constantly.

The reinforcement of our present stock of internal senses, or any of them by new stimulations, that imitate or repeat those by which the internal sense organ was differentiated in the first place, is harmonious and pleasurable. It is exceedingly gratifying to have our old opinions, tastes and preferences, confirmed and duplicated. One of the

most pleasant phrases in the language is, "I told you so."

Of course, the assimilation of new stimuli by the old internal sense organs, are not the only sources of harmony and inharmony. Some of the new sensations that affect us daily may have little in common with the old stock of memories on hand, but may have a relationship of general correspondence and agreement or disagreements that will make for indifference, or they may possess qualities that do not find the slightest toleration, from our already formed internal sense organs, but exhibit only repugnance, disgust or horror.

The basic principle, then, of pleasure, happiness, contentment, etc., is harmony: that is the harmony of the parts involved, between themselves, in any mutual action; to each other; and the agreement or reinforcement that may occur between the old habits of thought or action and the new habits of the same, made fresh, daily, to order, and automatically classed with them. If they agree and reinforce, the result is pleasurable. If they disagree and repel, the result is painful.

The stimulations in the environment, that assail us, may be described under two heads; those whose first onslaught upon us give us pain, and second, those whose impression upon us is at the first pleasurable. These divisions are not constant and invariable, but are different in different individuals and in the same individual at different times, it being quite obvious that what some would call pleasurable, others would re-

gard with aversion, and what one would regard as pleasurable today, he would consider an intolerable bore tomorrow. Then again, the same stimulation that in moderation, gives pleasure, will, if excessive, become painful, as too much heat, or light. Also a sensation agreeable at first, becomes irksome by fatiguing the tissues. The border line betwixt pain and pleasure then, being a variable, wobbly line, sometimes having a given sensory impression acting on one side of it, as a delight, and again on the other as a misery, leads to the suspicion that this line does not constitute a natural physiological boundary, but that we shall find some general law, governing the processes on both sides, and putting the sensations of pain and pleasure under related, if not identical physiological and psychical conditions.

But we have no difficulty in perceiving, that to each individual, at any moment, the division between pain and pleasure may become very real and well defined, and we may generalize this far, that the stimulations that figure in the man's sensorium as painful, lead to motor action calculated by its resistance, to work off and kill the feeling, leaving a blank where it existed, which interpreted in terms of feeling, means rest. We are now to consider what sort of difference occurs in sequels of their actions between painful and pleasurable sensations. It should be observed in passing, that a large number, perhaps a majority of all the sensations that assail us, are what might be called indifferent, since they are so nearly in harmony with the organs of our internal

senses, already established, that no violent disturbance results from their introduction and assimilation.

It is not difficult to show that incoming stimulations in adjusting themselves to the organs of the internal senses, in the production of new organs of internal sense, never form a product whose reactions in feeling can be classified as more than harmonious, any seeming deviation from this, as in mania and religious ecstasy, being due to the contrast of a large step, from a condition of despair to the highest position of harmony.

In the nature of things harmony is a state or condition that does not contain in itself elements of self-destruction. But nothing in nature is permanent. And in every organized body, there is wear and tear, even when it is as still and passive as possible. When we sit still, or think we do, if we carefully observe ourselves, we will see that we make some muscular movement, at least as often as once a minute. This is sometimes purposive, to change some part to a fresh position, but it is mostly automatic, and is done by the muscles without arousing consciousness. The same process goes on in the brain and psychic substance, especially during the hours of wakeful activity. As this substance becomes fatigued by its activities, they gradually subside, becoming constantly less intense, till finally all their energy is consumed, and they fall into the rest of unconscious sleep. They may begin again when recuperated by fresh direction of blood to them, and repeat.

All nerve action, like all other physical motion, tends to run down and transfer itself to become the motion of something else. The theory requires this. All feeling that gives rise to motor action, becomes the movement of muscles, or the viscera, the blood, the secretions of saliva, the coloring matters of the hair, the gall, the gastric juice, the heart and blood and kidneys.

The motion of the feelings therefore, is communicated to all or nearly all of our organs directly, and from and through them to objects outside of ourselves, appearing as motions of such external objects—sawing wood, pounding nails, running, speaking, writing, etc., as well as the thousands of feelings that may not lead to physical activity, as fear, love, hate, resentment, etc.

Laughter is a letting down from a disagreeable tension, by an explosion of muscle action, the same as happens by the voluntary transfer of stimulation to engage the muscles in walking, shouting, playing, etc., except that in laughter the explosion is involuntary.

In those cases in which by means of a good story, the feeling is purposely wrought up to the highest tension, in order that it may have the greater distance to fall; so the story teller conceals the point of his story as long as he can, while he works up tension in his hearers. The anabolic or front end of the tale, consists in the rearing of a structure as far above the level as possible, that is in making it as uneasy as possible, and the katabolic or final part, will go as much below the level.

Like a boy dragging his sled up hill, in order to have a ride down. Like an archer drawing back the bow-string, to give it the greatest force.

The simple feelings then beinning when first formed, at their highest potential position in regard to intensity, tend to work off their energy and run down just as other forms of physical energy do, falling step by step, suffering a gradual reduction in the amplitude of their vibrations, as they transfer their energy to other organs, arousing other feelings, or simply, cool it off, turning it into common heat.

This process governs all the feelings, regardless of their condition as to harmony or inharmony, happiness or misery. The action is automatic or reflex, and goes on without regard to the will, and frequently against it, when the slowly evaporating feeling is a happy one. But in addition to the waste of all the feelings by the natural wear of the feeling organs, is the wear of those whose functions are inharmonious, and unhappy, by the friction arising from their antagonistic interactions, in automatically seeking a mutual adjustment and correspondence.

Lastly there is a conscious or unconscious endeavor to exterminate or inhibit, all those feelings that contain elements of unhappiness and inharmony. This is done by the diversion of the blood from the inharmonious psychic organs to other psychic organs of sense, in the brain, or to the muscles, or the glands, or viscera. I have known a crowd of turbulent laborers pacified by an invitation to drink. The transfer of energy to

the muscles, is accomplished by simply putting the muscles in motion by which the blood is diverted to them, and to withdrawing it from the uneasy organs of the psyche. The intervention of the will is necessary to the movement of a limb or muscles, and the will itself is a creature of the feelings. So while it is entirely proper to speak of the feelings that automatically run down, and transfer their energy to other organs, as committing suicide, it is equally correct to speak of those that are robbed of their sustenance and energy through the action of the other organs, as having been murdered by the other feelings.

All our feelings are relative. We must distinguish between the positive happiness of harmony, and the negative or relative happiness of the movement from misery to less misery.

The latter is a negative sensation like black, the absence of color, or space the negative of matter. This negative feeling of satisfaction is seldom perfect or complete short of catalepsy or death. So that up to that limit, there is always a possible step, toward a more perfect rest from a point of comparative unease.

In perfect rest, we feel nothing, neither happiness nor misery, pleasure or pain, satisfaction or uneasiness. When perfect rest has been reached, this means that all feeling including the feeling of happiness or satisfaction, is at an end. As each successive step is taken, down this katabolic stairway, there is a relaxation in the intensity of the feeling, which by its contrast with the original **uneasy** feeling, seems like a positive

in one day, or he might protract its consumption so as to spread mild comfort through a whole winter. All the same, however, the feeling must be killed in whole or in part, before the sense of relief and satisfaction can be experienced. The candy must be dissolved before it can excite any sensation, and the wood must begin to burn before any warmth can be felt.

Those who experience the highest potentials of pain, also do, and are alone competent, to attain the greatest negatives of satisfaction. Children and emotional people are one moment depressed and the next elevated.

If the foregoing positions are well taken, it follows that all of our actions of whatever nature performed in consciousness, depend on and are immediately caused by, uneasy or painful feelings. If we never experienced an uneasy feeling, there is nothing to show that we would ever move a muscle. The government that holds us in subjection, is a government by pain. On all sides we are confronted by demons in the shape of "pricks and stings," warning us away, and it matters not which way we go, we are followed by the order to move **on and on**. Analyze our actions and we soon discover that each movement is stimulated by an uneasy feeling. I have pointed out some of the details that prove this generalization, as the movement of muscles from fatigue of remaining in one position for some time, the movements required to satisfy hunger, thirst, cold and heat; that take one to bed at night and cause him to rise in the morning,—that take him to his business, and bring him back; that take him to

his club, his lodge, the theater, the church, the prayer meeting and the social function, that make him walk, or row, or play ball, or skate or swim.

Now observe we are speaking of the actual and immediate last cause previous to, and causative of, the simple contraction of any particular muscle, and my object is to show that the formation of the will is always caused by an uneasy feeling, to which we may appropriately give the name "motor-feeling;" and to show a little more emphatically the strictly physical place in the chain of psychological or physiological causation, occupied by feeling.

It is possible to imagine cases, that appear at first sight to contradict the foregoing conclusion. For example, a criminal is to be executed. He is required to ascend the steps of the platform to the place of execution. Will it be strictly a feeling of uneasiness that will cause the contractions of the muscles necessary to meet this requirement? The question is does he not feel easier off the fatal platform than on it? There have been cases in which the criminal could not or would not go, and had to be carried.

But in every case in which he does comply, we readily see that the muscle contraction and the step taken do relieve a disagreeable tension. It is a question with the condemned man whether he will voluntarily go or be forcibly dragged up. If he concludes it would be more creditable to him to go without force, the decision puts him on a strain—with a corresponding purpose, a strain that can only be relieved by placing himself on the fatal platform;

which general purpose is relieved in seriatim detail by its transfer to the motion of muscle contracting.

Take another case—a boy going to see a play. This is similar to the other case in that a purpose is formed. The eager steps are taken, because they reduce, and finally consume the disagreeable distance, lying between the boy and his destination. Each step lops off a part of the distance, and at the same time a corresponding section of the restless, uneasy feeling, until the purpose is accomplished, and the whole feeling consumed in setting up the muscle contractions.

Now to return: Since uneasy feelings lead to motion which thereupon eliminates them, it follows that the action they lead to is pleasurable; that is the first feeling of discomfort, is by means of the muscular motion, succeeded by a negatively pleasurable one. What becomes of the pleasurable feeling? For the reason that it is pleasurable, we have no motive to get rid of it. On the contrary we are glad to have it stay. But it will not. Like all the feelings it tends to run down from the point of its highest potential to zero, zero signifying rest and cessation of feeling.

So it follows, that the bad feelings are put in a condition, through the action of the will, **impelled by the bad feelings themselves**, of gradual reduction in their virulence, till the mark is passed that divides positive from negative feelings, after which the sensation of a continued abatement of the uncomfortable sense, appears by contract like a mild, but vanishing pleasure,

ending in insensibility, so far as that line of feeling is concerned.

The right of a bad feeling to get rid of itself, can hardly be questioned. We all recognize that, and are all ready to assist the process, by advice and plasters, and pills, in the substitution of one feeling for another, which is nature's plan: when a man commits suicide, he does much more than kill his bad feelings. He murders the good feelings too, and the machinery for their production and reproduction.

The best anchored instinct of the ages condemns suicide as cowardly, undutiful and undignified. In the Egyptian hieroglyphic language, the most heinous sense of wickedness, was represented by the picture of a man committing suicide. The foregoing is to account for the fate of the bad feelings, that are condemned to use themselves up in doing good.

But there is the other class of feelings that was mentioned above, viz.: those arising from sensations of the environment, that give us pleasure from the first. They do not come under the domination of the uneasy feelings at all. Still their history is much the same as those that do. As said of the others they have no work to do; like a thing of beauty they are a "joy forever," to be repartaken of, whenever the appetite inquires of the memory. Thus the feeling aroused by the sense organs, being made of concrete things, may contain rare delights while those developed from the remains of decomposed miseries, give only the impersonal sensation of

satisfaction, relief, rest, sleep or a suffused or negative state of consciousness.

As it goes it leaves behind a flavor of itself on the sensory tissues giving the feeling of an agreeable time gradually vanishing. It merely exists for a fleeting term then flickers out. Its energy is partly used in setting up a new organ of memory.

If we scan closely the faces of the people we meet on the street, in the theater, on the train; after making due allowance for the attentoin required by them for the moment, in their present temporary occupations of shopping, gossiping, etc., it will be difficult for us to discover, any such marked difference between them, as to justify us in ranking one, as much above or below another, in regard to his mental condition of happiness or misery.

There are different planes of life, occupied by different people, living very different modes of life, each striving to adapt himself to the plane he happens to be on, and getting out of it as much satisfaction as he can, and when conditions admit, raising himself to the next plane above. Happiness as we have said is a state of harmony between oneself, and his surrounding conditions; that is, between his internal environment, and his external environment.

We may illustrate the conditions, by supposing all the people to be living on eight different planes, the richest at the top, and the poorest at the bottom. We may imagine the average man

on each plane, to be accompanied by his assets and valuables, including every thing he has that can afford satisfaction,—money, family, friends, influence, education, culture, business, character, will, perseverance, tact, etc. Some of the richest (by this assessment) may have very little money. Alongside of his pile of good things is another pile, that represents the encumbrance of uneasy and painful feelings, that materialize and go alongside of every sensation, and get more and more importunate unless attended to every moment, and leveled down by a will of ceaseless pertinacity. Each individual manipulating his assets, as above, the best he can, succeeds to a greater or less extent in adjusting-himself to the conditions of his place, so that his occupancy and use, shall be had with the least possible amount of friction. The life of the higher planes is on a larger scale, but the amount of satisfaction is probably no greater. The mounds of unease in the higher planes are absolutely larger, but relatively smaller than in the lower. A man in a lower plane trying to hoist himself into a higher one, will soon find that he has tackled a more costly undertaking than he thought, and is in a new environment, that it will take time and hard work to adjust himself to, and that after all, his care is no less, nor the painful perennial hump of feeling reduced.

What people accomplish then, by passing from one of these planes to a higher one, is simply a larger life; larger in any respect as money, influence, learning. If it gives him something

he craved or reduces his feeling of unease, let him weigh the conditions and cost and try for it. But there is a chance to fall as well as to climb. If the 10,000,000 man at the top, should lose his grip on his money, he might find out that his other assets alone, without money to "sweeten" them, would not hold him up, and that his hump of trouble, would be increased instead of reduced.

If he should fall through the whole eight floors, and arrive at the bottom a helpless wreck, with a mound of distress reaching from bottom to top, and not a chance of ever reconciling the wide inharmonies, that separate his present from his past, would it surprise, that insanity should supervene? Such cases are not rare. But they are not so likely to happen, when the loss is gradual. It also sometimes happens, that insanity results from a sudden rise, by which a state of things, never in the subject's mind before, is too suddenly set up. As if a sudden turn of fortune, should by some unforeseen chance hoist a man from 0 to the 500,000 mark—or suppose it was an aged mother, whose only son long strayed from home, and reported, and believed to be, dead. Her whole wealth is that son, and he no more. He suddenly without warning, makes his appearance sound and well. It would perhaps be said she died of joy. It was the shock to the psychic apparatus due to its suddenness. Broken frequently, with only a part of the truth administered at one time, all bad effect might have been obviated.

The law of pleasure and pain, as proposed by

Kant and supported by Bain, and Herbert Spencer, is as follows: "Pleasure is the feeling of the furtherance, pain of the hindrance of life." I think this is incorrect for a general rule, although the converse statement that health commonly gives pleasure, and pain is often allied with disease is true. But pleasureable feeling is no certain indication of health, although pain always means something is wrong, but not necessarily the bodily health. Possibly in the early history of the race there was a more marked relation between the terms health-pleasure, sickness-pain, than now, since we have established so many artificial relations and newly fixed habits, all of which must be harmonized with the original natural relations and the instinctive habits in order to produce satisfaction. Life is no longer so simple as it was, and more of our life and activity is second nature. And we must be reconciled to this. It is certainly true that the law of selection tends to the creation of a correspondence between health and satisfaction or rather between destructive conditions and pain. Pain is the danger signal that bids you "look out" or suffer disagreeable consequences, and so becomes the most powerful, almost an indispensable factor in the preservation of the race. On the other hand, pleasure or ease is often only a decoy lulling the victim into a feeling of security, and betraying him to the insidious inroads of a treacherous and fatal disease, as in consumption for example, and in the case of one exposed to freezing, who views as an enemy the friend who prevents him

from falling asleep. So of the opium fiend, the intemperate drinker, of coffee, tea and alcoholic stimulants. The victim realizes the injury he suffers from these, but often the pleasure of self ruin, is too great to be thrust aside.

Kant's generalization is thus only partly true, and his argument leaves out a portion of the factors that necessarily enter into the case, and disturb the conclusion. I should state the law thus: **Pleasure is the feeling of harmonious, and Pain the feeling of inharmonious relations existing between mental conditions.**

This definition takes into account the cases in which a disproportion is shown, between pains and hindrances of life, and between pleasures and furtherances of the same. A small pain often goes with a large injury to health, and an excessive pleasure with a small, or no effect, on health. Pain considered as a warning of something to be avoided, becomes a teacher of caution and in that indirect way a "furtherance of life" instead of its hindrance. As I have shown above, pleasure cuts little or no figure as a positive factor in the activities of life, either for its furtherance or its hindrance. The fact is that the furtherance and hindrance of life are mere incidents in the furtherance and hindrance of harmony in the relations of the feelings. And the furtherance of life cannot be absolutely assured by the mutual harmony of the feelings, while pain may prove a help.

CHAPTER XXII

Conservation of Forces.

Resistance is made up of properties of matter that give it hardness, stiffness, tenacity durability, inertia, density, etc. This resistance thus made up, constitutes with extension the distinguishing and essential attributes of bodies. All bodies or parcels of matter are endowed with all or a part of the above qualities or affections.

We do not have to define matter, or any of its phases, attributes or motions, by terms that take us over the boundary of sensible things, or transcend reality. When we have defined or described things according to their effects on our final sensibilities, they may be said to be described by axioms. This is not saying that we are to accept as infallible, the deductions from the elaborations of our sensations as conclusive. In fact, we are not above the liability of error, even in reading our sensations at first hand, much less in their meaning and interpretation. Each sensation, is a word spoken to us by some body in our environment; and if it is an important word it ought to be verified by a repetition, of our exposure to the impression, as they do important telegrams.

The term conservation of matter, implies the theory that none of it is ever lost out of the universe. This term is meaningless if matter is

infinite in extent. Inversely, if matter is limited in extent, but infinite in past duration, its indestructibility, and conservation are proved by the fact of its existence. Because, if it is and has been destructible, it would have ceased to exist long ages ago, since every thing that is possible of accomplishment at all, must be actually accomplished within a term of infinity. There are other proofs. Every conceivable effort has been made, dating from the old time alchemists to the present, to destroy and to create, and to transform matter, especially the baser metals into the nobler. These efforts gave the true science of chemistry its start, and it profited by its failures. It learned to analyze, compound substances, into their constituents, weigh them and recombine them, reinstating the compound without loss of material. The theory of indestructibility including the cognate idea of the uncreateability of matter, is now no longer called in question. It is called an "a priori truth," on which the weightiest problems of science and philosophy may be based.

Matter in Motion

It is improper to speak of matter and force, as if force were an independent self sustaining quality or entity; and from the way some writers speak of it, it might be either.

When we of the present generation, a few years ago fell heir to this universe, with full powers to do what we pleased with it, we found it at work, in high pressure running order. When it commenced running, or why it did not stop till

we were born, nobody knew. The people into whose hands the pursuit of knowledge was committed, have made diligent research, and have found out much, though by no means all.

As it appears that the doctrine of the conservation of matter and forces involves the ultimate question of their duration and extent, we will pause here a minute to look it up. There are three theories or hypotheses, of the origin of the universe.

The first is, self-existence,—by which the universe is supposed to have existed from all eternity,—never was created. This involves the idea of infinite duration in the past.

The second hypothesis is, that it came into existence of itself without help. This is too absurd to be considered.

The third is creation by an external agent. The difference between this conception and the first, is that the first has one inconceivable proposition, while this has two. We cannot conceive an existence without a beginning, but it is still more impossible to conceive of an existence beginning without a cause, from no beginning, or if a cause is assumed, to account for the cause, and if a personal creator is assumed, to account for the existence of the materials, and of himself as well.

The first proposition is the easiest of the three, and most commonly adopted by thinkers. The proposition that the universe of matter is limited in extent, (while infinite in duration) is not unthinkable nor inconceivable. To think of it as limited in extent, establishes the doctrine of the

conservation of matter. Because if any conditions exist by which we are losing matter; matter would now all be lost, and nothing would exist.

The theory of the "correlation and conservation of Forces" as commonly entitled, stands on the same footing as the conservation of matter. "Forces" is a short name for "matter in motion." So the motion of matter, is and must be coincident and coexistent with matter. We apply the same argument that we used in relation to matter, to prove the conservation of forces, or "bodies in motion." During the infinite past all motion would have been lost if it were losable.

What are commonly called the forces, are heat, light, sound, pressure, electricity, magnetism, galvanism, nerve force, chemical force, psychic force and others.

These forces are so related, that they are transformable one into another; such transformation being done at the expense of the transforming body. No force is exchanged for nothing. Heat is changed into electricity. Electricity makes a magnet out of soft iron, also makes heat and light. Magnetism changes and directs currents of electricity. All these set up motion in bodies, many of them directly and all of them indirectly, cause action of muscles and limbs, and the development of nerve and psychic force, in the formation of sensation, feeling and thought.

The foregoing are commonly called molecular motions or forces, to distinguish them from the visible mass or mechanical motions or forces,

as shown in the blowing wind, or the cyclone, the falling water, the movements of the heavenly bodies. All these physical forces, are stimulated by or give rise to the other kind. They are as intimate with the molecular motions, as the latter are with each other.

Now the quantities of these forces in any particular case, are not uniform. If they were, they would not be forces but properties. But they are being made up, or exhausted continually. Take the operation of a street car. Coal is burned, and the water in the boiler turned to steam. This runs a dynamo and creates a current of electricity; this turns another dynamo on a car, and this turns the driving wheel of the car. Thus for this occasion these forces were made. If there had been a strike they would not have been made and the total sum of active force would that day have been so much less if they used water power that day, instead of coal. When two belligerent thunder clouds approach each other, on a summer day, the greater part of their ammunition, the lightning, is made upon the spot, out of the hostile mass action of the clouds upon each other, lightning being an equivalent in molecular motion. In estimating the total stock of force in the universe or solar systems, at any given time, we should have to include the active or kinetic energy, and also the potential or sleeping energy, that may, under proper conditions become active. A little reflection shows us the sun as the source of almost all the energy that appears to us in the solar sys-

tem. The amount of energy stored up ages ago, by solar action, in coal beds, may be reckoned as so much capital, secured by long time mortgage, What we have in waterfalls, in wind, in animal power, in heat and light and gravity, is like so much currency in the bank, subject to check.

Add all these assets together, and include the day's consumption and the total at the close of each day's business will be just the same.

Force is Energy or work-power produced by the motion of bodies in mass or molecular; and is the equivalent of the amount of motion consumed in its production. Force is therefore produced by radiation, electric, sound, magnetic and the mass motion of gravitation.

Force is Energy or work power expended in producing the motion of bodies in mass or molecular; and the amount expended is equivalent to the motion produced.

The kind of energy expended is radiation, electric, magnetic, heat and light, sound and motion of bodies in mass and work done against gravitation.

Motion does not exist in the abstract—only in the concrete. There is no motion except motion of bodies when bodies move.

Page 331 Cor. and Con. of forces.

By J. R. Mayer.

"Force is something which is expended in producing motion; and this something which is expended is to be looked upon as a cause equivalent to the effect, namely, to the motion produced."

Conversely, motion is expended in the production of an equivalent of Force. Motion implies matter moving.

According to the definitions of force given here, it is shown to be a link in a chain of causation, being itself caused by the motion of bodies in motion, and on the other hand expending energy, in setting up such motions in other bodies. In other words, it consists only in the setting up of motions in one body or set of bodies, which motions they lose by transfer to other bodies, and they to others, and they to others, ad infinitum. The term "Force" inserted between these transfers cuts no figure. The transfer is not to a lump force, or from one but between those concrete bodies in local proximity, between which lies the path of least resistance. The term Force like the handle to a pot adds nothing to the efficiency of the utensil, but makes it easier of management. The question raised by the doctrine of conservation is this: In the transfer of motion from one body or group to another is any of it lost? The body that moves in the case of radiant energy, is the Ether. This extends as far at least as the most distant visible star, otherwise such star would not be visible. The Ether is a vehicle of heat as well as light. A part of the sun's radiation of heat, is intercepted by the earth and other planets, but much the greater part of it skips by and appears to be radiated off into space, never to return (?). It is certain the earth and the other planets have radiated their heat away; and no longer get any

considerable amount from their own insides. But what is lost to the earth or even to the solar system, may not be lost to the stellar system, to which we belong, and in estimating our loss we may have to assume as a factor an area as large as that. I think the argument advanced above in favor of conservation is the most valid and satisfactory.

In making an experiment for the purpose of testing what change, if any, might take place in the quantity of a substance by subjecting it to new combinations, Mr. Spencer points out that the chemist is obliged to use a weight as a unit of measure, to ascertain the weight of his substance before and after. The accuracy of the result depends on the constancy of this weight; and that is exactly the point to be tested. So if the weight of the body shows the same before and after, it is still not conclusive of the persistence of its value. But, obviously, some other unit of measure, as a wound up spring, could be used instead of a weight; or the expansive force of a heated gas or metal. Also the prediction of the positions of celestial bodies, if they succeed, and notoriously they do, are indications of the constancy of the units of the velocity and mass of the bodies. Now that the experimenters have verified the proposition of the unchangeableness of the various elements by numerous experiences we regard it as an established fact, just as we do all other propositions, as set forth in Chapter 4.

There is no better proof of the doctrine of the persistence of force, than the self evident state-

ment that a force cannot exist, except as developed by an equivalent antecedent force, nor disappear without giving rise to an equivalent subsequent force; and so on forever. It is this endless repetition in equivalent but unlike terms, that gave and justified the epithet of the conservation of forces, or that other epithet adopted by Mr. Spencer of the "Persistence of force."

If conservation were not true, and if the loss of energy to our universe were proved to be only one grain in a million years, it would a million ages ago have stopped running. That it has not ceased to run is proof that it has not lost a grain of force in a million years. The circumstantial evidences, and our mutually supporting experiences constitute as good proofs of the persistence of forces, as the conditions of our existence permit us to have of anything.

Over 50 years ago the scientists announced the doctrine of the correlation and conservation of forces, and the indestructibility of matter. The forces they alluded to and had in view were those given several times in the foregoing pages,—light, heat, magnetism, pressure, etc., all regarded as real as anything else we know of. They did not regard them as phantoms, phenomena, or appearances. Light was what it purported to be—the motion of something, viz., ether; and the same with heat, magnetism, and electricity, all the immediate products of the sun's radiations. Similarly with sound, gravitation, muscular and psychic or soul forces, and the forces of moving masses. Science regarded these as real, and actual, and not mere ghosts or

symbols that stand for realities hidden somewhere in the background, but which they do not resemble, any more than x , y , z , resemble the unknown quantities they stand for in a problem in algebra.

About that time, 50 years ago, Mr. Herbert Spencer was bringing out his "Synthetic Philosophy." He accepted the doctrine of the "Correlation and Conservation of Forces," and changed the name of it to "Persistence of Force," and adopted the doctrine as the basic principle of his philosophy. By an analysis of the question, he comes to the conclusion that the "Persistence of Force is an ultimate truth of which no inductive proof is possible." (P. 188.) There are many good and sufficient reasons for believing in the conservation of forces, a number of which have been pointed out, but it is not on any of these that Mr. Spencer bases his Persistence of Force as an "ultimate truth."

P. 188—"We might indeed be certain" * * "that there must exist some principle, which, as being the basis of science, cannot be established by science. All reasoned-out conclusions whatever, must rest on some postulate." * * "Whoever contemplates the relation in which it stands to the truths of science in general, will see that this truth transcending demonstration is Persistence of Force."

We shall now see why the term "conservation of forces" was changed to the singular "Persistence of Force."

P. 97—"We have seen how impossible it is to get rid of the consciousness of an actuality, lying behind appearances and how from this impossibility results our indestructible belief in that actuality."

That is true of **Appearances**. We do look for a reality behind them; but when we come into contact with real things, we commonly know them for reality and distinguish between them and appearances. We do not, however, go outside of our experiences to find either.

The trouble with much of this metaphysical verbiage lies in the misuse, or unusual use of terms. Take "appearances" or "phenomena." I should define these as mental pictures; our dreams and the play of the imagination, the reflected impressions of our thought. They might be called the **mind of things**. Behind all these lie their cause, some, if not most of which will be found in the brain itself just alongside of their work. Outside, but within reach of us lie the objects that have forced themselves upon our attention. We mostly agree that these things actually exist. At the outset of this book we agree to call them actual realities. They must be real whether our knowledge of them is complete or incomplete. We cannot by thinking or neglecting to think blot them out of existence. The fact that we get impressions from them is proof of their actuality even though the impressions, as interpreted to us, are nothing but symbols. We agree with Spencer as to the fact of an "actuality lying behind appearances," but we do not agree that these realities ought to be classed as nothing but appearances.

"The forms of our experience oblige us to distinguish between two modes of force; the one not a worker of change, and the other a worker of change actual or potential. The first of these—the space-

occupying kind of force—has no specific name. For the second kind of force the specific term now accepted is “Energy.” “But what is the force of which we predicate persistence? It is that Absolute Force of which we are indefinitely conscious as the necessary correlate of the force we know.” (Collins’ Epitome of Spencer, P. 24.)

Thus Mr. Spencer’s persistent force is identified with his Absolute Force, the same as the Infinite and the Unknowable; and his warrant for this is an **indefinite consciousness!**

It is not this force—the one that is “not a worker of change,” with which we have to do, but those real forces that science has introduced to us, forces that are “workers of change,” whose existence we do not have to postulate, but which we know as we know the members of our family, and whose indestructibility is as certain as that of matter. Nobody has ever seen or felt Mr. Spencer’s Absolute, and never will, if it is not a “worker of change.” The only proof of its existence is an assumption. If it does nothing, neither persistence nor force can be predicated of it. Mr. Spencer has introduced us to a land of religion and dreams, where he expects religion and science to coalesce, but where we find science conspicuous by its absence.

P. 188, Mr. S. says: “But now what is the force of which we predicate persistence. It is not the force we are immediately conscious of in our own muscular efforts, for this does not persist. As soon as an outstretched limb is relaxed, the sense of tension disappears. True, that in the stone thrown or in the weight lifted is exhibited the effect of this

muscular tension and the force which has ceased to be present in our consciousness exists elsewhere. But it does not exist elsewhere under any form cognizable by us. It was proved (S 18) that, though on raising an object from the ground we are obliged to think of its downward pull as equal and opposite to our upward pull, and though it is impossible to represent these pulls as equal without representing them as like in kind, yet since their likeness in kind would imply in the object a sensation of muscular tension, which cannot be ascribed to it, we are compelled to admit that force as it exists out of our consciousness is not force as we know it."

P. 189, Spencer—"Hence the force of which we assert persistence is that Absolute Force of which we are indefinitely conscious, as the necessary correlate of the force we know. Thus by the persistence of Force, we really mean the persistence of some Power, which transcends our knowledge and conception. The manifestations, as occurring either in ourselves or outside of us, do not persist; but that which persists is the unknown cause of these manifestations. In other words, asserting the persistence of force is but another mode of asserting an Unconditional Reality without beginning or end."

He says (in effect) we cannot represent equal pulls or weights as equal, unless we represent them as like in kind, and since the force on one side of the balance has a brain and nervous system, the other must have also. But since it does not have such likeness, it follows that force as we know it is not force as it exists outside of ourselves. "Hence," he says (in effect), the persistence of the force we

assert is not predicated of the force we know but of an Absolute force. This is not true of any body but Mr. Spencer, and perhaps one other. The forces of which we predicate persistence are the ones we know to be real. They are the ones we have read of, and seen in their effects, and of which ideas are formed whenever they are mentioned and of which the scientists predicated conservation or persistence whenever they mentioned the subject, meaning thereby the constancy of its aggregate quantity and equivalence, through all its varying forms and exchanges, none of which are permanent or constant. We do not mean by persistence of forces "some power which transcends our knowledge and conception." The knowledge we possess, as far as it goes, is to us supreme and is not transcended by anything except more knowledge. We have a definite and easily conceived notion of the stream of Energy like an endless train of matter forever moving forward. Is the Absolute Force like that? The fact is, Absolute Force, persistent or otherwise, has no meaning to science. We have no conception of force without the agency of matter. I suppose our knowledge will be remanded to the region of appearances where what we reckoned as Reality, becomes merely phenomenon.

However, Mr. Spencer (P. 167) grants that sometimes at least, matter may be really what it purports to be. We know forces objectively the same as we know matter. The same metaphysical quibbling Spencer displays in regard to persistence of force, if applied to matter would easily put us out of contact with it.

The Absolute Force conceived as being at rest and changeless, is no force at all. It is only motion and matter that create and constitute force, and the conception leaves out both of these factors. Spencer, notwithstanding his assertion that persistence of force cannot be proved, goes on making deductions from it and calling it an "ultimate universal truth." He speaks of the forces we know, as manifestations of his absolute force. As the forces we know cannot be operated without the expenditure and transfer of motion, the absolute force could not have contributed the necessary motion, for as it is denominated, a "space-occupying kind of force" and a non "worker of change," it could not engage in any "manifestations," without disturbing its own persistence; and it would lack the physical competency to produce the matter required, without which motion is impossible, since motion implies something to move.

On P. 167, Spencer admits the reality of matter. He says: "But as we have lately seen, though known to us only under relation, matter is as real in the true sense of that word as it would be could we know it out of relation; and further, the relative reality which we know as matter is necessarily represented to the mind, as standing in a persistent or real relation to the absolute reality. We may therefore, deliver ourselves over without hesitation to these terms of thought which experience has organized in us. We need not in our physical, chemical or other researches refrain from dealing with matter as made up of extended and resistant atoms," etc., also "aggregate masses."

(I do not agree that matter is represented to the

mind as standing in a real relation to the **Absolute** and find no warrant for the Absolute itself, **which** is admittedly unprovable.)

This must apply equally to forces which **depend** on matter for their manifestations such as **gravity**, light, etc., depending on the ether for transportation by its atomic movement from the sun to us, and without which there could be no manifestations. Interpreting it thus, it follows that matter with its motion as we know it, is after all real and we may treat it so! That metaphysical philosopher feels that he would be laughed at, who would assert its unreality, against the experience of workers who come in actual contact with it, or who would assert that the bodies they know and manipulate, were only symbols of an absolute reality assumed to transcend and nullify their experience.

Step up to a chemist who is engaged in boiling some of Mr. Spencer's "phenomena" such as potash or sulphur, in a pot, and ask him if he thinks the stuff is real. One could imagine his quizzical expression when he tells you to stick your finger in the pot and get an original opinion for yourself.

Since matter is real, as Spencer here admits, and the Absolute can not be any more than real, it follows that matter and the absolute are equal in duration, that is equally infinite. But if the Absolute shares infinity with an entity, it is no longer infinite for there cannot be two infinities.

Suppose we inquire in what shape or description the Absolute force which is said to stand as the relative and cause of the forces we know. The forces we know have a backing in the resistance of

material bodies, which is, in fact, a compound and concretion of resistance and motion, with bodies to resist and bodies to move. I cannot conceive force to be constituted in any other way—but is the Absolute force so constituted? It cannot be force if it be destitute of these two qualities, and how could it unite them in itself unless it were a material body and on the move. That describes the forces we know. Mr. Spencer's Absolute, having no attributes, is not describable.

Almost without notice, Mr. Spencer has seized the **Persistence of Force**, transported it aloft and made a God of it, and such a god as can not even be pointed to by scientific induction, nor discovered in the most tangled mazes of metaphysics, nor made to stand when supported by the most prodigal use of assumptions.

P. 192.—Herbert Spencer, speaking and using the most extravagant language in regard to the doctrine of the conservation of force, or, as he calls it, the "Persistence of Force," says: It is "Deeper than demonstration, deeper even than definite cognition, deep as the very nature of mind, is the postulate at which we have arrived." Its authority transcends all others whatever, for not only is it given in the constitution of our own consciousness, but it is impossible to imagine a consciousness so constituted as not to give it." * * * The sole truth which transcends experience by underlying it is thus the Persistence of Force.

E. L. Youmans follows Mr. Spencer in the same vein, asserting the "Persistence of Force" to be the "underlying principle of all being," and also the

"fundamental truth of all philosophy." "It has yet a more transcendent character, is in fact an a priori truth of the highest order," * * "broader than any possible induction and of higher validity than any other truth whatever." * * * "The highest result of scientific investigation and metaphysical analysis."

Mr. Spencer, in his metaphysical reasoning, comes to what he calls **pure force**, the "ultimate of ultimates." We do not find any such thing in nature. We find but one sort of force and that is what is derived from the movement of matter. There can be no such thing as an "ultimate" in a string of causation that has no beginning and no ending, every link of which gets its all from that or those that went before and gives its all to that which comes after.

There cannot be two kinds of energies. We see one kind in association with matter born of its motion and push, and in its death giving birth to new motion. We see that temporarily every single piece of matter is possessed of more or less motion, and that temporarily it transfers it to some other piece, in the shape of work or power to do work universally in the concrete; nowhere do we find it in the abstract. Nowhere a wholesale storage of it, nor a wholesale price, nor is it in the custody of an Absolute or an infinite. There is only one price, whether to an angel or a moneron, and that is strictly the **cost-in-kind**—labor paid for by labor.

If by **pure force** is meant force disconnected from body, it is not conceivable. Even elec-

tricity and light have their backbone and resistance in the material ether. No force without resistance—no force without motion of matter. If the Absolute is under the necessity of these conditions it is no longer Absolute.

I wish to emphasize what was said above in regard to the limits of force; viz.: that if it is limitless, the term "persistence of force" has no meaning. If it is infinite, it persists of course. What is there to destroy it? If it is infinite, an everlasting leakage would not reduce it. But if the proof comes first that it persists, it does not follow that it is infinite, but only that what exists now always has existed. It is not infinite for it corresponds with matter (or bodies) in territorial expanse, and unlimited duration, conditions that we postulated, in reference to the cosmos at the beginning. Matter and force are coextensive, force arising from the motion of matter, cannot overlap matter and can only exist as far as matter extends. Therefore, it is limited in quantity while unlimited in duration. Being limited and bounded it cannot be the Absolute or the infinite.

Mr. Spencer says that the doctrine of the persistence of force cannot be established by induction, yet he asserts that persistence of force is the foundation of all science, philosophy and religion. We have, as I have shown, very respectable inductive proofs of the persistence of the forces we know. I admit there are none whatever for the transcendental force invented by Mr. Spencer

The presence of attractive force associated

with matter, such as chemism and gravitation, etc., is possible only to the present conditions of matter as to temperature, etc. Give a temperature of a few hundred degrees below 0 and every chemical force would be obliterated. There is no unconditioned or original force residing in matter. And it is the height of absurdity to speak of matter and force as one and the same as said by Mayer and others quoted by Buckner, also Buckner himself.

Buckner, in "Force and Matter" page 2, says: "We must admit that matter as such, could make no impression on our sense organs or minds, it can only do this by means of the forces united with or at work within it." "A piece of lead held in the hand presses on it because of the attractive force of the earth and so produces the idea of weight." It is not matterless force that produces weight. It is matter in motion—ether—that does it. If it was, force could exist without matter. The pulling force must be associated with matter and it is the motion of the matter, ether, that constitutes the pull of gravity. How is the sensation of light created in our sensorium? By the shaking or jostling of a nerve which is a body in motion, against the retina of our eye.

The same of sound. It is not an impalpable force applied to the ears that makes it but is a body—air and ether—both in motion, said body pressing against the ear drum—a body also. The ear drum shakes the ear bones, four little bodies. One of these, the stapes, shakes the membranes of the inner ear. Up to this point

the jostling has been done by ponderable instruments. The rest of the way to the brain is an electric or nerve current—motion of the nerve, a body. Go outside and see what started it. It was the bark of a dog, say. When he barked he set in motion the air between him and the man's ear drum, and this air in motion it was that constituted the force that pressed on the ear drum, and each step consisted of a jar communicated from one body to another in succession. These bodies must come into actual contact.

It is precisely matter that does make the impression on our sense organs. But the matter has to be made to *move* before it does it.

A body in motion then is a force—it does not lead to a force some where else, but is force made right on the spot. Whenever a body moves a force is developed. I have shown in another chapter how every body is a center of force, the quantity of which varies with the nature of the body and its conditions and capacity, no two being alike in that respect, any more than they are alike in weight, size, shape, texture or other conditions.

During terms of rest whatever store of energy is contained by the body is in a state of unstable potential which is liable to be disturbed by the collision of a new body, such collision developing energy and raising the potential of the first body, and perhaps setting it in motion to transfer its accumulations to a third body and so on.

If when one body strikes another, the struck body fails to move as a mass, it is because it has sufficient capacity to absorb the motion, and by

scope and others without limit. The production of these involves the production of a prodigious number of producers in the form of smelters, foundries, machine shops, blacksmith shops, instrument makers shops, and a vast number of books. And all these imply and require the talent, skill and perspiration of members of the human race—in vast numbers, with the further implication that they must be supported, housed fed and clothed.

Knowledge is costly—has spirit got the price? Note, that I am treating spirit as an assumed **immaterial** substance. I think it is nowhere assumed to be material.

If it is, it would have to be tried by the laws that govern matter, and tested as to its qualities and properties by the same chemical and physical tests that are applied to other material bodies.

Now, in order to be possessed of knowledge, it is essential that at least the knowing substance shall have at command all these means, appliances and facilities.

I do not know where on earth such knowing substance will obtain its knowledge, except from the human race. Each member of that race has a psyche and almost all of them are in more or less command of the facilities of knowledge, through the actions of the psyche which equally with spirit is a substance in which knowledge may be accumulated, and stored up as we have seen in the foregoing chapters. Our psyche then, to a certain extent, is like spirit, as above defined. But if spirit is

destitute of the means of acquiring knowledge, it is a long ways behind our race with its psychic feeling—substance, and it becomes an anxious question what duty has been assigned to it, or what particular niche in the architecture of the universe was spirit designed to fill.

But knowledge depends on something more than mere appliances, facilities, opportunities and even outside assistance. The knowing substance must possess capacity on its part, to arrest appropriate and assimilate the motions that constitute knowledge. In other words, it must be of such constitution that it can receive impressions, and have them elaborated into ideas, reasonings, thoughts and knowledge. It is said to be immaterial. Can an immaterial substance meet these requirements? Our human psyche can and does meet them, up to its capacity. But it is associated with matter, and is called matter and is described in terms of matter and it behaves like matter. It receives the impacts of physical forces from outside bodies, and elaborates and co-ordinates them and delivers the product to other outside bodies. The operation from beginning to end is physical, and all the phenomena are the phenomena of material forces.

All this is too simple, and too obvious, too easy, too likely; not enough mystery. Anything can happen if there is a sufficient cause for it. But what the credulous want is miracle—they want things to happen without sufficient cause. Probably for that reason, they demand that the thinking and knowing substance shall be called

immaterial. Or it may be that they think that the thinking substance should be of light and airy texture, extremely attenuated and elusive. Such an idea might arise from the confounding of the thinking substance with the thought it produces, which is often done, making no clear distinction between the two. If the thinking substance be regarded as immaterial, the greater would be the miraculous nature of anything it might be supposed to accomplish, because from an immaterial substance, no results at all could reasonably be expected.

Those who convince themselves of the real existence of spirit are prepared to predicate upon it any wonderful or impossible performance. The more helpless from a physical point the spirit appears, the more powerful from the view point of myth and miracle, because these are what it lives on.

We have seen in the preceding chapters how the psyche is a thinking substance and a mind forming organ. yet associated with the other physical organs such as limbs in mechanical motions, and with the stomach and other viscera in chemical activities, all such associations, proving the strictly materialistic constitution of all the parts thus related. We found our argument on the reality of the external world, and we are as sure of the argument as we are of its foundation.

The basis of the spiritualist argument is an assumption. Beginning with spirit as the antithesis of matter, they think they find all the subsequent terms to repeat the constitution of the

first, so, in imagination, these terms are all spirit, and the world is a spirit-world and things are not what they seem, and everything is unreal. The substance of spirit is supposed to be "essentially identical with what we call mind."

Thus the spiritualist assumes, without proof, that consciousness is a spiritual phenomenon and builds all the metaphysical portion of his system on it.

What is meant by spiritualists here is not confined to those composing that sect so called, but all who believe in spirit, as a separate entity, or in spirits as smaller entities, commonly the transfigured forms of human beings. The latter are not by any definition pure spirit. They are said to control mediums, materialize, become entranced and perform various other physical actions. If they do, they possess resistance, extension and motion, the essential qualities of matter, and they cannot be classed as spirits at all, but as a different variety of men, and they belong to the tribes of fairies, elves and demons, and in due time will follow them to the limbo of all the venerable superstitions. All the so-called "manifestations" that go with these are material phenomena, or fraudulent.

As for "pure spirit," or "immaterial substance," to us it has no existence, and is absolutely unknown.

The materialist bases his inquiry on the matter in his environment, and feeling his way toward himself by mechanical contact and resistance and extension, he finds an unbroken continuity of physical terms of cause and effect, and himself his psyche at the end; of like intrinsic constitution to all the rest. It would make no difference if, following the spir-

itual hypothesis, we were to drop the terms "physical" and "mechanical," and insert "spirit" in place of "matter" provided the terms "resistance" and "extension" with their true meanings, and full significance, are retained. If the conception of "spirit" included the conditions and qualities that give to matter its force, the name would cut no figure. The chain would be a binding chain if all the links were there, regardless of the name it goes by. But the links are not all there. By insisting that the spirit is immaterial, it is deprived of the qualities of resistance and extension. Without **these** qualities, spirit can have **no** qualities. They sometimes say spirit has these qualities. If it had there would be nothing to distinguish it from the material, and they would be postulating a distinction from matter without a difference and practically yielding their whole contention. In short if spirit has not the vital functions and constitution of matter it cannot exist at all. If it has them, it is not spirit but matter.

The spiritualists make two vital assumptions, both wrong.

First, that no material body can feel. Second, that immaterial bodies can.

We have shown that there are specially organized physical bodies that **do feel**. Now what evidence is there that there are immaterial bodies that **do feel**?

These alleged bodies are commonly called spirit and are of two kinds. One is an abstract body existing beyond the reach of phenomena, a conceit that on analysis yields only negation.

The argument that banishes spirit from the association of matter, on the ground of the incom-

petency of spirit by its constitution, definitions and terms, to unite with or come in contact or in working order with matter, holds good for a universe, as much as for a county. A spirit substance, co-existent with matter, yet not associating with it or on terms of mutual assistance, regulation and equilibration, is an illogical, and unnecessary conceit, and gives us no result.

Once on a time a telegraph line running out of St. Louis suddenly gave out, and a section crew was sent out to see what was wrong. They found the line broken and tried to pull the ends together, but could not. They finally spliced the gap with a piece of grapevine they found there, and returned to town to report a successful repair, and they were much disappointed to find the line worked no better than before.

A gap in psychical phenomena must be closed by something more substantial than a piece of spirit.

Conservation of matter does not include conservation of any kind of matter that does not possess resistance and extension; therefore no provision is made for spiritual substance. Science takes no account of such a substance and has never found it.

Yet spirit in the abstract must be conceived to be thus helpless, functionless, barren, in short, a pure negation, or else not conceived at all apart from matter. The conception of spirit without the inclusion of material elements is impossible. But as said before, all that part of the conceit that entertains conditions of force, or extension,

or any property of matter, is matter and all the rest is idle myth. But as shown, destitution of the qualities of material bodies, includes inability to feel.

The consciousness with which the spiritualist professes to "set out" with his metaphysical reasoning, is not supposed to be composed with any factors drawn from the external world of matter, but from a factitious world of spirit, the result of a metaphysical, transcendental conception, which when analyzed and reduced to its lowest terms yields only pure negation. That a consciousness constituted thus ever "sets out" at all is pure make-believe. As a matter of fact, the spiritualists introduce into their conjectures enough matter and force to give them an air of energy, and furnish the physical motive power, without which no system of any sort can exist or appear to exist.

But their doctrine is one thing and their practice quite another. They teach spiritualism, and practice materialism. They deny the possibility of contact between spirit and matter, and in this they are correct, for a substance conditioned as they condition spirit is incapable of being in contact with anything, even with other spirit.

Thus they have, by the necessity of their erroneous assumptions, made believe that the external world is altogether different than it appears, that it is in fact mind instead of matter. They have founded numerous religious cults upon these erroneous assumptions, and raised hopes and expectations not realizeable from their own

barren premises of spiritualism, and so they have invaded the external world of matter and picking out some of the most unusual occult, startling and mysterious phenomena, especially those related to pathology, they seize on them as spiritual and, (like Mrs. Eddy), invent dogmas to occupy the territory between reality and pure myth, with fables or else with facts mostly mistaken and irrelevant from the former, and wholly fictitious from the latter. The effect of mental action on the secretions is not denied, on the contrary it has been insisted upon elsewhere. It is under the influence of this that all the practical results are attained that they ever reach.

Spirit or immaterial substance **cannot do the** business of feeling. It has **got to be** material, because in order to feel, the feeling substance must be by forces assailed from the material environment. This assaulting force must make an impression on this immaterial substance. But it cannot by its terms, because if the immaterial substance can be affected by forces originating in the material environment, it is itself material, and masquerading under a false and contradictory and self destroying postulate. But if it is a bona fide immaterial substance, it cannot do the work of receiving, comparing and correlating the stimulations necessary to the development of a feeling or knowledge. Every stimulation darted upon it from the environment passes through it as if it were blank. In truth it **is** blank. For what other sort of proof is required or possible to prove nothingness, when no resistance is opposed to

force. As long as the world outside of us is physical, **only a physical body can think or feel.**

For the reason that an immaterial substance does not possess **resistance**, it cannot stop a ray of sunlight as a man or sheep can, and so it is blind. It cannot stop a pulsation thrown from a sonorous body, and therefore it is deaf. It cannot stop any of the fine dust that brushes against our olfactory membrane, nor come in contact with soluble bodies, nor with bodies in motion, and so cannot taste, nor smell, nor feel. Having no weight nor resistance, it has no power of locomotion and so cannot go anywhere. These deprivations would disqualify any sort of being for existence on earth.

The spiritualist is in a dilemma. If spirit cannot feel, think and act, it has no claim nor capacity for existence. If it can feel, think and act, it is not an immaterial, but a material substance, and therefore not spirit.

Whatever people may have imagined, no one ever conceived of an immaterial substance. A conception requires the expenditure of energy by the object as well as the subject. A conception must be a conception of some particular thing. If that thing can reflect sunlight, we could get a sensation. If we could feel it we could get another and so on till we get enough sensations to elaborate into a conception. But if the object can reflect none of these forces, skepticism takes the place of conception and denies that there is anybody there. But the conceiving body—the soul—is also itself conceived by the spiritualists to be immaterial and the case is doubly worse, because by its terms the conceiving

soul or spirit is also destitute of all apparatus for the establishment of a conception. It cannot hear, see, speak, smell or feel any pressure or contact, or any nervous or telepathic stimulation. The fix this puts us in, shows us two dummies. one of which is absolutely incompetent to either speak or make signs, and the other is equally incompetent to hear or understand a word if it could be uttered.

When any one imagines he conceives of an immaterial thing, a little reasoning will show him that he has mistaken material phenomena for immaterial. His thoughts and images are in reality all in terms of matter, and cannot possibly be otherwise.

We come to the conclusion therefore, in regard to the conception of spirit as held by believers in it, that it is composed of two pieces.

One is a small amount of odd bits of physical science designated by factitious and mysterious terms.

The other piece is a collection of factitious and mysterious terms without the incumbrance of even a smattering of science. In other words, shorn of what it filches from matter and materialism, all its assets including itself, amount to just 0.

CHAPTER XXIV.

Limit of Knowledge.

In the last chapter, in dealing with spiritism, I pointed out some of the conditions of knowledge. It is not necessary to repeat these here.

Naturally the limits of knowledge are the limits of the real universe. Any object inside of that boundary is knowable, on the condition that such object carries with it energies, the exertion of which can make impressions upon one or more of our six sense organs. When there is an absence of impressions, we assume that there is no object. It is hardly necessary to say that knowledge is of all degrees of superficiality or thoroughness, depending upon the number and variety of the disturbances emanating from the object of the knowledge and upon the elaboration and orderly arrangement of these raw materials of thought.

The metaphysicians have handed us down a law, they call the "relativity of all knowledge" which is a rule for the classification of such certain knowledge as we possess. But dissatisfied, apparently, with the legitimate use of this rule, they try its application outside the barbed wire fence that marks the limits, beyond which there is absolutely nothing on which to apply it, a deficiency they fill by postulating an absolute being.

Spencer, on the "relativity of all knowledge," says: "A true cognition is possible only through

an accompanying recognition." That is, you can have no knowledge of a thing, unless when you discover the thing you can recognize it as having a relation, a difference and a likeness to some other thing that you have known before. This definition is too broad for the facts. There are too many exceptions. It is true, that in one sense all the things on earth are related, and that, therefore, the knowledge of things is likewise related. No matter how odd, new and strange the thing, you find, in some particular it is like another. It is vegetable, animal or mineral or gas. It may agree with another or disagree in color or weight or texture. If there were only two things on earth, some property in common to both of them could probably be discovered. But all our knowledge does not consist merely in classifying objects. We want to know their qualities, properties and utilities. Very often these things do not admit of classification, although a knowledge of these is knowledge as much as their classification. Take the product of the india rubber tree, classify it as far as possible, and you will still have a quantity of material not classable, but a possible mine of knowledge.

Again, consider the luminiferous ether. It is unique, not to be classed or grouped with anything else. Whatever we say about it must be said in terms of matter, the same with anything else. Does that classify it? It has a motion called undulatory. Conceive of a sheet held taut and given a jar at one end, which conveys a quiver toward the other end. Then conceive other sheets set on edge, and set at every possible angle to the first and second, and

things. But as we advance we shall find our metaphysicians postulating an unconditioned Being, which they consider under the three aspects of the Absolute, the Infinite and the First Cause. This Being they place out of relations—that is, outside of the limit of the law of the relativity of knowledge, and here, regardless of their insistence of the limited scope of this law, they do by strenuous but misplaced effort, endeavor, by the application of this same law, to determine the nature of the postulated Being.

Spencer must have considered the law of the relativity of knowledge to be of great importance, when in such a case as that of the child and the adult in pursuit of knowledge mentioned above, he found it necessary to press to its support so weak an argument. But it appears that whether exactly true or not, it is essential in support of Spencer's system. Sir Wm. Hamilton and Dean Mansel, as quoted approvingly by Mr. Spencer, both agree that the conclusion of their logic is that, "It does not imply that the Absolute cannot exist, but it implies most certainly that we cannot conceive it as existing." But while admitting that their own reason and logic point rigorously to the utter negation of the conceit and the utter nothingness of the thing, they still cling to some vague hope or wish that their Cause may turn out less disappointing than their Philosophy.

P. 74—Sir Wm. Hamilton says "the notion of the unconditioned is only negative—negative of the conceivable itself." "The infinite and absolute properly so-called, are thus equally inconceivable to us."

"We admit," says Spencer, "that the consequence of this, the above doctrine, is that **philosophy**, if viewed as more than a science of the conditioned, is impossible."

Sir Wm. Hamilton says: "We are warned from recognizing the domain of our knowledge as necessarily coextensive with the horizon of our faith, and by a wonderful revelation, we are thus in the very consciousness of our inability to conceive aught above the relative and finite, inspired with a belief of something unconditioned, beyond the sphere of all comprehensible reality."

Thus the domain of our knowledge proving too small, he is obliged to find room on the horizon of faith and accept on faith and inspiration "a something unconditioned" that he could not demonstrate by his logic.

Mr. Spencer again takes up the argument and referring to the doctrine of the relativity of knowledge, brings into its light for trial, his supernatural creations, the First Cause, the Infinite, the Absolute and the Unconditioned—all in one. The first task is to find known objects with which to class these for comparison. Neither the First Cause, the Infinite or the Absolute can be grouped without losing their character. There cannot be two First Causes or two Infinities—one would become Finite—nor more than one Absolute—a second one would become a relative." "The Unconditioned, therefore, as classable neither with any form of the conditioned, nor with any other unconditioned, cannot be classed at

all, and to admit that it cannot be known as of such or such kind, is to admit that it is Unknowable."

"Every thought involves relation, difference, likeness. Hence we may say that the unconditioned as presenting none of these, is trebly unthinkable."

This is the outcome of the trial of a postulate of zero value by a court of admittedly non-competent jurisdiction, viz., the law of Relativity.

P. 88—Spencer proceeds: "Observe in the first place that every one of the arguments by which the relativity of our knowledge is demonstrated distinctly postulates the positive existence of something beyond the relative." "To say that we cannot know the Absolute is by implication to affirm that there is an Absolute. In the very denial of our power to learn what the absolute is, there lies hidden the assumption that it is. And the making of this assumption proves that the Absolute has been present to the mind, not as a nothing but as a something."

I fail to see how the successful denial of all power on our part to learn what the Absolute is, can be construed as proof that it is. Before we try to learn what a thing is, we commonly assure ourselves that the thing is there to be examined. If nothing is there, if we begin at the wrong end of the inquiry and try to find qualities where there is no entity, and where the only proof of the existence of the entity lies in the discovery of attributes and qualities and we fail to discover any attributes or qualities I consider it proved so far as this argument

goes, that the alleged thing does not exist. It might be considered proof that they *thought* it existed, but that is all—and it is nothing.

It may be admitted as Spencer avers, that “every one of the arguments by which the relativity of our knowledge is demonstrated, distinctly *postulates* the positive existence of something beyond the relative.” So much the worse for the “something beyond the relative,” when the doctrine of relativity of knowledge framed by the help of that “something” turns upon it and argues it out of a conceivable existence.

Again Spencer, P. 88—“Similarly with every step in the reasoning by which this doctrine is upheld. The Noumenon everywhere named as the antithesis of the Phenomenon, is throughout necessarily thought of as an actuality. It is rigorously impossible to conceive that our knowledge is a knowledge of appearances only, without at the same time conceiving a Reality of which they are appearances, for appearance without reality is unthinkable.”

Spencer's trouble seems to be that he insists in regarding the real world as only “appearances.” I take it the appearances are the impressions made upon our thinking substance by the objects in our environment and these objects constitute the Reality behind the appearances that Mr. Spencer is looking for. He looks too far away. He seems determined to find something where there is nothing. Our knowledge is not a knowledge of appearances merely—it is a knowledge of things, and we get at this knowledge by the use and interpretation of appearances. These appearances may be considered made up by all the forces that press upon us from bodies

external to ourselves. Our knowledge is necessarily incomplete, but as a rule we absorb all of it we want or need, and if a second or third impression is required to make our knowledge more complete on some particular point, we expose ourselves to a repetition of the first sensations on such point, and so we reinforce the appearances including as part of them the test of the Relativity of Knowledge.

If real knowledge of Reality cannot be obtained by this process, knowledge is a term without meaning.

P. 87—Spencer asks, "There still remains the final questions"—* * * "is the result of inquiry to exclude utterly from our minds everything but the relative? or must we also believe in something beyond the relative?" "The answer of pure logic is held to be that by the limits of our intelligence, we are rigorously confined within the relative, and that anything transcending the relative can be thought of only as a pure negation or as a non-existence."

"The Absolute is conceived merely by a negation of conceivability," writes Sir William Hamilton. "The **Absolute** and the **Infinite**," says Dean Mansel, P. 87, "Are thus like the inconceivable and the Imperceptible—names indicating not an object of thought or of consciousness at all, but the mere absence of the conditions under which consciousness is possible." (Then Spencer). "From each of which extracts may be deduced the conclusion that since reason cannot warrant us in affirming the positive existence of what is cognizable only as a negation, we cannot rationally affirm the positive existence of anything beyond phenomena."

But neither Spencer, Mansel nor Hamilton is reconciled with the deductions of their philosophy. Hamilton, as quoted above, has to be satisfied with a conviction of a wonderful revelation," a belief with which we are inspired, of "something unconditioned beyond the sphere of all comprehensible reality." Dean Mansel says, we are "compelled by the constitution of our minds to believe in the existence of an Absolute and Infinite Being."

Thus these apostles of English metaphysics reach the end of their logic at the boundary line of the law of knowledge.

I have shown this, above, to be more comprehensive than the doctrine of relativity and I give the benefit of the margin to the metaphysicians. If they persist in going forward they go without the light of fact or logic.

Our knowledge all stops at the boundary line between **something** and **nothing**. The metaphysicians appear to miss the place and go on by.

But Mr. Spencer is not willing to let the Absolute escape without a tag, and launches another argument. There are, he says, two kinds of consciousness, a definite and an indefinite. "Logic formulates law of the first and the last cannot be formulated." It is a vague, nameless "something," and cannot be expressed by quantity or quality. This indefinite consciousness is residuary, made up of the raw and unformulated scraps and surplus of the unused materials of thought.

Just how the chaotic and disorderly mess constituting this indefinite consciousness, transcends dis-

tinct consciousness, or is more competent than it to bring the Absolute within its reach is not obvious.

Spencer says: "The very demonstration that a **definite** consciousness of the Absolute is impossible to us, unadvoidably presupposes an indefinite consciousness of it. We are obliged to form a **positive though vague** consciousness of this which transcends distinct consciousness." * * * "At the same time that by the laws of thought, we are rigorously prevented from forming a conception of Absolute existence, we are by the laws of thought equally prevented from ridding ourselves of the consciousness of Absolute existence, this consciousness being as we have seen, the obverse of our self-consciousness." "There must be a residuary (indefinite) consciousness of something." "It is impossible to give to it any qualitative or quantitative expression whatever, but not less certainly it remains a positive and indestructible element of thought."

A definite consciousness of the Absolute being demonstrated impossible, it follows according to Spencer, that a vague, disorderly and indefinite consciousness of the same object is possible and effective. We are told that "we are obliged to form a **positive though vague** consciousness of this, which transcends distinct consciousness." To what end?

What qualities of the Absolute have ever been found by this vague, transcendal consciousness? Again, utter failure to find out **what** the absolute is, is regarded as proof that it is.

In view of the foregoing, where has Mr. Spencer

mislaid his doctrine of the relativity of **all** knowledge? He declared emphatically that only the conditioned could be weighed in the scales of relativity—and hardly all of them—and that by the most experienced subject, with a reliable and, of course, **definite** consciousness. Now he proposes to gauge the Absolute itself and acquire a second hand residual indefinite consciousness made up from the scraps, shavings, bark and leavings left over from the definite. The personal factor which in science is eliminated as far as possible, is in metaphysics made the corner-stone of the whole structure.

If the quality of the soap produced by a manufacturer should depend on the religious or political belief of the workmen, or could be affected by their stature or color, it would be classable with the lubrications of the subject whose state of consciousness could be disturbed or vitiated by a spell of sick-head-ache.

Collins P. 303—Mr. Spencer alleges that J. S. Mill tacitly assumes that all men have adequate powers of introspection. "Whereas **many** are incapable of correctly interpreting consciousness, in any but its simplest modes, and even the **remainder** are liable to mistake for dicta of consciousness what prove on closer examination not to be its dicta."

The way it appears therefore, is that one-half of the possible subjects are probably wrong, and the other half mistaken. Spencer appears to believe in a hereditary cult developed by an infinite series of experiences, the impression of which, through instinct, is vastly more valid than any test furnished by single individual experiences. But it must not

be forgotten that all these hereditary experiences are simmered down to and incorporated with, an individual experience, the final average constituting the so-called state of consciousness of the subject. But every individual has inherited from the whole race. All are heirs alike and should be equally skilled. Thus this metaphysical philosophy is founded upon a postulate or assumption which is alleged to be derived from the state of consciousness or state of feeling, of a subject, such state of feeling impressed upon the thinking substance by the only possible process in existence, viz., by way of the senses erecting experiences personal to the subject himself or by absorbing through the same channels and incorporating with his own, the experiences of other subjects. But it is clear that no subject ever did or ever will reach a state of consciousness, the basis of which is, or can be, any object outside of conditions, or any object that gives him any idea whatever of a supernatural character.

When a subject thinks he is contemplating or postulating an absolute or an infinite, or an unconditioned, he is mistaken, and falls under one of the classes of subjects mentioned above, of whom "many" can not interpret consciousness except in its simplest forms, and the "remainder" do not understand its dicta. However he labels his state of consciousness, it can never rise above its source and never relate to anything above the material environment.

As I have said before, the raw materials of thought come to us from the environment, in the shape of sensory impressions. Almost everything

of value is capable of being counterfeited. By the use of the imagination, factitious conditions can be made to imitate anything we please, real or unreal. We must discriminate between the genuine and the counterfeit. We may be sure that no genuine impressions ever come to us from a supernatural source for the reason that there is no such source. Impressions that we interpret in that way are delusive. Partial and vague states of consciousness are none the better for being vague.

CHAPTER XXV.

Space.

Our six senses have been built up, and are kept in running order, and are operated by positive or actual modes of energy, in our environment. These forces when in action, produce in us various sensations or feelings, the presence in us of which after we have learned by habit to perceive them, gives to us what we call our knowledge of such objective forces, and of the bodies or things from which forces emanate.

Whenever any one of these forces ceases to assail us, there is a cessation of our sensation of such force or object. We become aware of this cessation or the absence of sensation, when it thus ceases, just as keenly and certainly as if we were assailed by a new and different positive impression, from the environment giving a new sensation of something.

But it is obvious, that we could not thus have any sense of such cessation or negation, of a sensation, unless we had had experience of such sense some time before. We cannot miss anything we never had or knew of. One who has never used opium, does not miss it when he is without it as does the victim to its use.

So a person if born and reared in darkness, like the blind fish in Mammoth Cave, would have no sensation of the absence of light. But we who have enjoyed the light all our days, have a feeling or sensation of its absence, when night ends it or we go into a dark cave or mine. Now it is obvious that this seeming sensation of absence or negation, is not a sensation derived from darkness, because darkness is a condition in which luminous energy has ceased to be present. We get simply no impression at all from darkness. The very vivid knowledge we have of the cessation of light, and the fact of darkness, does not consist of a direct impression from any object in the environment, but is in the nature of a **perception**, something reasoned out from positive sensations of light, and color that we have experienced before. We compare positive objective impressions, and sensations, with their absence and thus obtain a perception of the difference.

So an anaesthetic person, who has lost the sense of touch, may have a perception of the fact by the contrast between a touch sensation and no sensation, but when his fingers come in contact with an object, he does not have a sensation of not touching the object, he simply experiences no sensation at all in the nature of touch. It is so in regard to all our

senses. In paralysis of the senses of taste and smell, if the subject has memories of past sensations he becomes aware, by contrast, and comparison, of his present deprivation. But even when the senses are still active, if there is a deprivation of anything we have had in the past, we can perceive the contrast between possession and deprivation, although we well know that when deprived of the thing we get no positive impression or sensation from the thing. Opposite every sensory faculty and its irritation, and sensation, we may place its absence or negation from which we get no sensation, which is in fact nothing at all to us and yet of which we get a lively perception, which is made out of the contrast between positive stimulations and their absence. Opposite pairs of this nature we might list by the thousand.

A consideration of this principle is necessary in considering the problems of Time and Space.

In the following list I place the positive sensations on the left. On the right are their opposites or negatives, or as we may properly say, their corresponding nothings, from which we get no stimulations, irritations or sensations, but of the nothingness of which we become aware, inferentially from impressions and sensations, that are created in us by the impact of the various forms of energy fired upon us, from the positive and real objects, by which these nothings are bordered and bounded.

Objective or positive sensations, arising from the impact upon our psychic substance, of energy reflected or radiated from real objective bodies in our environment.

Matter in Motion

Taste—Smell

Touch

Warmth—Heat

Life

Light

Color

Sound

A Present Time

Motion

Plenum

Matter, Substance,
Something

Conceptions or Perceptions of their Negatives or opposite nothings.

Matter at Rest

Paralysis, Want,
Deprivation

Anæsthesia

Cold

Death

Darkness

Black

Silence

A Time Ended

Stillness, Rest

Vacuum, Void

Space, Emptiness,
Nothing

Edge of the Related Universe, the Boundary between Something and Nothing.

It is apparent that most of these sensations may be subdivided and particularized indefinitely, so that there are really hundreds of thousands of possible sensations, that have, of course, their opposite negatives or nothings. Thus in taste we have the thousands of fruits, nuts, confections, cereals, relishes, meats, oils, medicines, liquors, each of which, as a general list, comprises thousands of special and simple objects, by each of which a peculiar sensation may be generated in our psychic organs of taste, and the case of smell is very similar; almost every article that gives us a sensation of taste also arousing a sensation of smell.

In touch, we have the various subdivisions of sense, that arise from the contact of various sorts of bodies—as smooth, rough, wet, dry, soft, hard, sharp, dull, pointed, blunt, etc., or to be more specific, we have the sensations given by the touch of glass, cloth, silk, fur, water, oil, grease, sand, hair, putty, thistle, mucilage, dirt, stones, etc., also sensations arising from variety in forms, as round, square, flat, edge, corner, hollow, groove, point, slope, ridge.

There are also many sensations connected with light and color, and sound, arising from difference in pitch, timbre and various combinations.

Of motion, we have an innumerable variety of sensations, too obvious to need enumeration, and the same is true of matter or substance. Indeed the sensations we get from these last include all the rest, for we get no sensations at all, except by the motion of energy reflected from material bodies. In

the foregoing list the left hand column, expresses sensations produced in our sensorium by actual energy.

Sound, for example, is a sensation. And it is produced in us by a succession of pulsations from an elastic body, a real material object, capable of vibrating in a manner sufficiently strong to throw a human ear drum into active motion, and communicate motion to certain cells in our brain. Silence on the other hand is nothing—that is, it is nothing with relation to sound. The nothingness of silence does deny the existence of other sensations than that of sound. Our conception of this nothing is not derived from any impression from an external object or instrument. Silence gives off no energy, sends forth no pulsations, and if we had never heard sounds we should never have had any conception of silence. When a sensation of sound ends, we perceive the contrast between having a sensation of sound and not having one. We perceive that over the border of sound there is nothing. If there were no border or end of sound, we never could have reached a perception of silence, any more than if there had never been a sound.

By the senses of sight and feeling or touch, we get sensations of the existence of material things, and of their having dimensions. We feel, as well as see, along the sides, edges and corners of a box, and perceive that the box is bounded on all sides except the floor, by nothing, that is by no tangible or visible substance, and while by scientific research we discover that in reality there is something around the box which our senses fail to grasp, yet to our

senses and by contrast with the solid material of the box it is nothing. This nothing as a contrast with solid or tangible matter, we call **space**.

It would seem paradoxical and illogical to assign dimensions to a nothing, yet by a sort of convenient license, we do speak of the dimensions of a given space. We measure material things by the number of pieces or things they consist of. Such a thing as a box is measured by what it will hold—so many apples or eggs or nuts. A space cannot be measured in terms of space for its terms, are 0; but it is measured in dimensions of material bodies, or rather it is the bodies we measure.

We say a box is four feet long; that is, as long as four feet. The foot we thus measure by, was the very material and substantial pedal extremity of a British King.

If the box is empty, its inside is a true nothing to our perceptions, as contrasted with its solid walls. Yet in common language we speak of the dimensions of such space, and say it is, e. g., four feet long, three feet wide, and two feet high. In such cases, careless of logic, we treat our space as it were a substance. But in reality we make our measurements, not in the space but on the solid walls of wood that bound it; and if it were not thus bounded by matter and we had no material standard of measurement we could not even pretend to measure the space.

We cannot picture to the imagination two bodies so far apart, that a continuous strip of matter reaching from one to the other, would be of infinite or immeasurable length. Every piece of matter must

have a definite position, with reference to every other piece. We cannot conceive any piece existing in independence of such relations to all other pieces. Everybody must have trigonometrical relations to every other body.

Therefore, we cannot conceive of measureless or limitless matter.

We can, however, conceive of a space beginning at a body of matter, but not limited by another body, in an opposing direction; hence we can conceive of infinite or measureless space.

Whatever conception we are able to form of infinity stubbornly refuses to connect itself with matter.

A space in such relationship with material bodies, that the imagination can conceive it as filled with matter is measurable, because matter is measurable and in imagination we call it matter, but space independent of such relationship, and which we are incapable in imagination of filling with matter, is infinite and is by us easily seen to be inevitably so.

We cannot imagine a point in space independent of relationships with all imaginable points on matter. No number is infinite for whatever the number is, one more can be added, therefore we cannot imagine points, either numerous enough or far enough apart to define peripheral limits to abstract space. Therefore space beginning at bodies of matter, and extending away from them, is measureless, and limitless; therefore, not real—but nothing, and not to be reckoned as a necessary factor in science or philosophy.

Spencer says (*Epitome*, P. 21): "All we can as-

sert is that space is a relative reality." This "implies an absolute reality."

If space is a reality, I would understand that it is matter or substance. But common sense tells us there is a difference between matter and space. There seems, according to Spencer, to be two spaces, a **relative** as big as the universe and an **absolute** much larger!

Collins (Epitome, P. 273) says: "The consideration of occupied space cannot be dissociated from the consideration of unoccupied space. The two being distinguished as resistant extension, and non-resistant extension, it is impossible to treat of either without virtually treating of both." The reply to this is, there is no such thing as **occupied** space. When it is occupied it is **not** space. Matter has its limitations, its edges, and boundaries, its indentations, its holes, its cracks and crevices, and intermolecular vacuums. All these are **spaces**. Wherever matter is **not**, space, i. e., nothing, **is**. Again, there is no such thing as non-resistant extension. That which is non-resistant has no extension. Mr. Spencer has himself said, that he could not by any effort separate the conception of extension, from that of resistance. Neither can extension be possible without resistance. But these two qualities are the essential qualities of matter. They describe matter and not space. Anybody that has one of them, has both. Space cannot have extension—dimension, without resistance, and having either, it is not space.

Collins (Epitome, P. 274): "How through the experiences of occupied extension or body can we ever gain the notion of unoccupied extension or space?"

By experience, "there come to be endless positions conceived as existing apart from body." Chiefly imagination, I think. Unoccupied extension he calls space. Space can have no extension, otherwise it would have resistance, and be classed as body or material substance. His idea seems to be, that in our experiences, we locate all objects by our senses in our environment, in space. When by motion, the objects themselves pass out of our cognizance, we retain the relative positions of the bodies, which positions are points in space made so numerous by experience as to fill space and give us "that consolidated idea space in its totality."

Collins (*Epitome*, P. 295): By no effort can anyone separate or think away space and time from the objective world and leave the objective world behind." (Here we are met by that vicious personal factor, that has no business in an argument.) It requires no great effort on my part, to separate in thought spaces from bodies, if I can see the edge of the bodies. I cannot conceive of space as a body having extension and resistance. It is absurd to speak of the attributes of matter such as extension, when there is no matter to extend any more than smoothness where there is nothing to be smooth.

The mere conceptions of distances from us to other bodies of matter in sight, unaided by scientific instruments, make a very vague and unreliable basis for a philosophy. When babies first see the moon they want to take it in their hands, for a plaything.

Eliphaz, the Temanite, in the days of Job, must

almost infinitely have underrated the distance to the stars, in the exclamation—"how high they are"—Job, 22-12. Astronomers before the time of Copernicus estimated the distance to the moon at 20,000 miles. No one attributes any retardation of the speed of planets to any resistance, residing in the quality or material of space itself. I do not believe a majority in a popular vote would declare space to possess solidity.

Space possessing neither resistance, extension or motion, can have no relationship whatever to us. It is not visible nor audible. We cannot weigh it, feel it, smell or taste it. We do not know, nor has it any means of telling us whether it is smooth or rough, whether it has surfaces, heights and depths. Is it a chaotic mixture or a homogeneous mass? What can we discover about it? Nothing, absolutely nothing. We might as well inquire of Mr. Spencer's Unknowable. Mr. Spencer calls it a "relative reality."

In order to show a metaphysical method of proving the somethingness of space, Mr. Spencer, P. 164, says in affect as follows

"The Abstract of all sequences is Time; The Abstract of all coexistences is Space." * * * "Any limited portion of Space can be conceived only by representing its limits as coexisting in certain relative positions." * * * "And since a position is not an entity—since the congeries of positions which constitute any conceived portion of space, and mark its bounds, are not sensible existences; it follows that the co-existent positions," * * * "are not co-existences in the full sense of the word (which

implies realities as their terms), but are the blank forms of co-existences, left behind when the realities are absent; that is, are the abstracts of co-existences." These abstracts have been generated "during the evolution of intelligence," out of "experiences of individual positions, as ascertained by touch; and each of such experiences involves the resistance of an object touched and the muscular tension which measures this resistance. By countless unlike muscular adjustments, involving unlike muscular tensions, different resisting positions are disclosed." These he regards as co-existing. "But since under other circumstances, the same muscular adjustments do not produce contact with resisting positions, there result the same states of consciousness minus the resistances—blank forms of co-existence, from which the co-existent objects before experienced are absent:

* * * 'That which we know as space is relative.' "Is there an **absolute** space which relative space in some sort represents?" "Is space in itself a form or condition of Absolute existence, producing in our minds a corresponding form or condition of relative existence? These are unanswerable questions. Our conception of space is produced by some mode of the unknowable," etc.

A limited portion of space, according to this, is measured by "co-existent positions," that are **not co-existences** in the "full sense of the word, but are **blank forms** of co-existences left behind when the **realities** are absent. The result of all this seems to be that "different **resisting positions** are disclosed." But ordinarily the same adjustments "do not pro-

duce contact" with resisting positions, the result is the same state of consciousness **without the resistances**.

The conception of a **body** from which the **quality of resistance** is **left out** has little left. Our conception of space must be in some sense miraculous since it is "produced by some mode of the unknowable." Can some one tell us what blank forms of co-existences are like? According to these extracts from Spencer, it seems we can get a conception of a limited piece of space by bounding it by relative positions which are described as follows. **They are not entities** and are not sensible existences; nor are these co-existent positions, co-existent in the **full sense of the word**, but must be realities in part; and they are blank forms left behind when the realities are absent.

He seems to hold that we first get an impression of an object by the process of feeling it or experiencing a state of consciousness relative to it. Then removing the object, we perform the same muscular adjustments and the result is the consciousness of the object as at first, with the consciousness of the object itself left out which as nearly as I can make it out is the same as no consciousness at all.

The fact is that the metaphysical method of treatment of this subject is by **intuitions** that are claimed to be the heritage of the race. (I quote from *Epitome*, Page 274.) "The general theory of the **space intuitions** which we recognize as **necessary**, the reader will now see, is that they are the fixed functions of fixed structures that have become moulded into correspondence with fixed outer relations." I never realized the possession of any in-

tutions, and never heard of anybody else that did, by which a solidity and constitution of space can be proved or even plausibly assumed. I do not believe that the experiences of the race ever generated intuitions on any subject of cold philosophy.

Their intuitions were mostly confined to religion and developed from experiences of spooks, hobgoblins, appearances, of natural wonders, such as comets, earthquakes, volcanoes, etc., and of plagues and pestilences, miracles, wild and noxious beasts, snakes, and insects. If we define an intuition as being a tendency to believe certain things or classes of things on little or no evidence, which is the true definition of the word, we must see that it is a very vague and uncertain foundation for anything, where truth is desired. As said before, it is not difficult after one has removed a material object like a stove, to realize that the space it occupied is **nothing**, any more than to realize after a horn has ceased to blow that silence has supervened or than when the lamp is extinguished, darkness has supervened. Would it not be absurd to assert that silence and darkness are relative realities? A gentlemen having handled the dog so as to scent his hands, then introduced them to a nest of new-born kittens, they showed their instinctive aversion by the most vehement spitting and raising the fur and thus exhibited real inherited intuition.

Space having no attributes, no attraction, no repulsion or anything whatever; it cannot even furnish terms for its own description. When it is referred to or talked about, it has to be done in terms of matter. They speak of **points in Space**.

They never attempt to locate these or imagine them located by any landmarks on space itself, but when they set a corner and establish witnesses, the corner and the witnesses are always measured from some sun or planet, or corner stone, and described by measurements from material bodies, with miles or the radius of the earth's orbit for the units of distance.

In our measurements on earth, we use dimensions of material bodies for our units of measure. We use the word space in a double sense. As the vacant distance between two houses is often called a space. But we measure it with a material tape line.

The use of the term either considered as a relative or an absolute reality is not necessary or required in the consideration either of time, motion, or energy. Whatever credit has been given to space as a factor in the argument, should have been given to the positive **matter** and not to the negative **space**. Whenever distance is required, it is supplied by the extension of matter or some division of it. There is only one property they venture to assign to space, and that is **extension**. That means dimensions. But how could a body possess dimensions without substance to be measured?

Space is a negation. Destitute of values, it is expressed by 0. It is destitute of attributes or conditions. It cannot be weighed or measured. It has no resistance, and no extension "occupied" or unoccupied; and no motion or time. It is not interconvertible with matter. It has no mathematical functions, and cannot be multiplied or divided, nor develop a square root or cube root. It has no dens-

ity and there is not a spot on it from here to Aldebaran on which one could stick a postage stamp.

Herbert Spencer (P. 69), says that to speak of space and time as nothing is to assert there are two kinds of nothing, which is absurd. No, sir; there is only one kind of nothing. But there are many ways by which we become aware of a partial or total disappearance of something—not absolutely, for nothing disappears for good or except with relation to ourselves. We have no direct relationship with nothing. We know of the presence of something only by the impact of force directly from it. We cannot do this with nothing because nothing does not project or reflect or resist force. There is only one thing we can learn about nothing, and that is its nothingness; and there is only one way we can learn that, and that is by way of perceptive reasoning from the resistance of a material something. So our idea of nothing either in spaces or space, or time or times, is obtained by placing ourselves in direct relationship with bodies co-existent or in motion, and maintain such relation, until through the limitation of the bodies or the motion, the relationship ends in a void.

Thus a man with his eyes shut can run his hand along the top of the table till he comes to the end, where the sensation of contact with a body terminates and no sensation at all supervenes. You then perceive that any body possessing resistance may obstruct a road to vacancy. There may be many such. But when removed, the nothing uncovered by each is just the same. The same when a motion ends, and is succeeded by silence. You have

reached nothing, by the removal of a different obstruction, viz., noise.

There may be others with regard to the nothing that supervenes at the close of a finished sequence; a bell taps three, six, nine, twelve times—then stops. The ear following these strokes is sensible of a body in motion. At the end it instantly becomes sensible of nothing, and this nothing is just the same as any other, only approached by the removal of a different sort of obstruction, whether of a body at rest or a body in motion. It is the obstruction of a body in any case.

The practical test of nothing is absence of force from it. If it could make itself known, it would possess energy and be something.

The sense of the presence of nothing is arrived at indirectly by the stimulations of circumjacent bodies considered in one group.

All nothings, are therefore alike in this; that they make no sign, and reflect no force.

The limits we have discovered between Time and Eternity and Matter and Space, must constitute what are to us, the end of knowledge—the end of the application of the law of relativity. Science extends her investigations to every nook and cranny inside the limit of that enclosure and would climb over if she could, but she cannot do it, and remain science. Outside, the limitless, nothing—space, eternity, silence, darkness—is a region to be peopled and by the unreal creations of the metaphysical imagination.

But these creations based on nothing and rapidly sinking, naturally stretch out for support to any solid

thing in reach, and so their sponsors find themselves instinctively grasping for help, their worst enemy, Science.

But as I have shown in previous chapters, there is no compromise, no sympathy, no conciliation, nor reconciliation between fact and fancy. Inside the inclosure we have the first, with yet rather too great an adulteration of the last. Outside is the last—indistinct, vague, unreal.

The edge, or rather the surface, of the universe, which we have discovered as the boundary between bodies and spaces, is extremely variable and ragged. Strictly speaking it should everywhere be at the limit of our powers of sensation and investigation, but these greatly vary by reason of the incessant movement of bodies constantly disturbing the detail of this boundary. The universe, so far as it is accessible to us, and therefore, properly speaking, our universe, is really a very small proportion of the whole that exists, but it is steadily growing, as our facilities for investigation increase, and our knowledge expands. No matter what the future may add to this our domain, we have every reason to believe we shall find it all under the same natural constitution. If by any possibility we should find anything supernatural, our finding it will make it natural. Fertile and prolific oases of solar systems, separated by stupendous stretches of desert space across and through which the ripping bolts of light and gravity tear their way without leaving a scratch; such is our universe.

CHAPTER XXVI.

Time.

Our sense of time depends fundamentally on our perception of motion, and its contrast of pause—no motion or rest. The alternate succession of day and night would arouse an impression or sensation on the souls of even the most uncultivated savages. But it does so only because there is a perodical cessation, pause, or change from motion to rest or to other sorts of motion. If there could be a monotonous motion without break, pause or change of any sort, such motion would give us no sense of time. It would be the same to our sensations as unvarying rest or motionlessness. As a matter of fact, we do not, during our waking consciousness, ever experience a complete cessation of all motion. We may be in the presence of machinery of various kinds, of moving people, horses, cars, wind, clocks, bells, and observe various movements connected with the operation of our own physical economy, such as breathing, the pulsations of heart and arteries, the movements of the digestive apparatus, that bring on periods of hunger, thirst, etc. We constantly become conscious of the pause or cessation of one or other form of these motions, but never all of them at once. If we were conscious of only one sort of motion and it should suddenly stop, we should at once become conscious of nothing that is uncon-

scious and we should, of course, have no sense of the passage of time. But this never happens.

We are always, when in a normal waking condition, aware of many things in motion. If one motion ceases for a while and then is resumed as when a street car stops at a crossing for a passenger, we can and commonly do estimate the length of the stop or pause. Now as this, according to the definition above is simply a **nothing**—a nothing to the something of the car's motion—it cannot be that the length of the same is ascertained by measurement in terms of the pause itself, but it is made in terms of some other motion that keeps on while the car stops. Most people carry watches, and they may observe how many of the spaces that form the little circle on the watch face the second hand jumps over while the car stands still. And so they measure this nothing in terms of another sort of motion called seconds.

But without the watch or any exact standard of measurement, people still reckon such pauses or nothings by simultaneous motions of many sorts. The movement of our brain in the production of feelings and thoughts affords a rough measurement, which by much habit and experience we have learned to compare with and render into the more exact standard of the clock. In a rough, inexact, sub-conscious, semi-instinctive way, we reckon about so many thoughts, feelings, reflections, etc., go to the minute or hour. The feeling of fatigue comes on step by step with some regularity
us a standard of measurement that we in-
ely use to measure the pauses or negative

stages in motions of other sorts. A person getting tired of sitting still will form an estimate of the time from his feelings. When our sensations of all motions pause or are succeeded by their negatives, and there is no rhythmic succession of any sort, then we lose all sense of the passage of time. This cannot happen to us during normal consciousness, but may be approached in ordinary sleep if very profound. In common sleep, however, we seem to have left, one or two faculties on a sort of sleepy sentinel duty, so that if we are awakened prematurely, we have some rough idea of the length of time we have been asleep.

But in catalepsy, the severance of the consciousness from all relationship with the environment is absolute and complete, so that the patient is not even aware that there was any pause or cessation in his consciousness, and a person who has been stopped in the middle of a sentence by a cataleptic spasm, has been known to go on and finish it upon his sudden recovery after months had elapsed, of which lapse of time he was entirely unaware.

So, too, those people who are subjects of the strange phenomenon of double personality are always, while in state No. 1 entirely unaware that time elapsed while they were in state No. 2, and vice versa.

If we could imagine a total and permanent cessation of motion, we should imagine the end of Time.

Eternity is the immeasurable nothing that constitutes the opposite of motion that has finally ended. A sound that never will be uttered again is succeeded by an eternity of silence—that is silence as

opposed to such particular sound. The last breath of every dying man is succeeded by an eternity of rest—rest as to the movement of that special pair of lungs. The pause between any two movements of the same instrument or apparatus is measurable in the movements of some other instrument. But where the pause is never succeeded by a resumption of the motion, such pause is immeasurable. It is eternity with respect to that motion and the time that it registered; and such time has forever ended.

As each given or special motion; that is the motion of each thing that now moves; will certainly come to a final and definite end, eternity or rest or nothingness with reference to each such motion will supervene, and here Time is merged in Eternity.

Yet although times will end, times will also begin. The ending of every form of motion or the motion of every instrument or apparatus, organic or artificial, when its ends for the last time, implies in its ending, the beginning of something new.

Thus, every complete time or series of rhythmic repetend uniform motions in beginning ends another and in ending begins another. Before it, was nothingness, a negation of itself, after it, again nothingness.

Thus it is possible for us to entertain the conception of times and times and times innumerable; Some barely lasting while the clock ticks a single second, others enduring for ages and millenniums. We have seen the beginning and the ending of myriads of them, and our reason based upon our observation convinces us that no time ever did or ever will lack either a beginning or an ending. Yet, although

all times will end there will forever be times. For by the well ascertained law of the persistence and indestructibility of energy and motion, we know that the motion of no body can stop with annihilation. When it stops, the energy with which it moved is transferred to the body that stops it, and thus at the moment one time dies another one is born.

Times are the measures of the motion of matter in motion.

Time considered as an abstract proposition embracing all times and having a beginning is unthinkable because it implies the beginning of motion from previous no motion, admitting or not, the previous existence of matter at rest.

Neither is the end of motion thinkable, for it implies the sudden rest of matter from a state of motion, and the disappearance and destruction of energy.

Time, as a measure, is an instrument of our own devising or selection, for the measure of motion on the extension of some portion of matter. Space does not enter into the elements of time.

The measurement of motion is not on space or in space, but on matter. The timepiece is now a clock. It used to be a burning candle, then an hour glass.

In nature there are many timekeepers. The earth in its diurnal and annual revolutions, the moon, the tides, the planets, etc.

In the Morse system of telegraphy we have an illustration of the principles governing the conceptions of both measurable times and spaces.

In this system the letters of the alphabet are formed by dots and dashes separated by blank spaces, formerly made on strips of paper. It is obvious that the spaces are as essential as the dots and dashes. In fact, but for the spaces, the dots and dashes could not exist, but would form a continuous line. When an operator receives a message in the usual way by the ear, each dot or dash is represented to his ear as a sensation of sound, and each space represents a pause in time during which he has no sensation, but of which he has just as full a perception and certainty, as he has of the positive sensations that denote the dots and dashes. The sensation of the dash is also plainly different from that of the dot but only as regards its duration. The measurement of the spaces, although they are nothings or negations with reference to the dots and dashes, is made in terms of the dashes. And the pauses are measured in terms of motions performed by the operator or in the operator's physical economy, as heart pulsations, breathing, etc.

If the lengths of the spaces could not be given in terms of the dashes, or in terms of the matter by which they are bounded or paralleled, they could not be given at all, and we would have no way of knowing whether their lengths are a quarter of an inch or a thousand miles.

There are certain conditions of existence that we see are inevitable and of necessity must be. They are axiomatic and yet demonstrable by experiment.

One is that without motion, no two bodies of matter can occupy the same place.

2. That without motion no single body **can** be in two places.

3. Any body in motion must change its position with reference to other bodies.

4. When a body is cognized in two places it follows that there has been motion.

Any body in existence must occupy a definite position with reference to every other body.

Therefore, all the relations of matter must be limited and measurable.

It is difficult for a boy just commencing arithmetic to comprehend that to multiply nothing by a large number, say 500, the answer is nothing and if you increase your multiplier to 100,000 the answer is still stubbornly 0. If space and time be represented by 0 the efforts of the metaphysical philosophers to get something out of them must prove futile. If they insist upon multiplying these nothings by the qualities and attributes of things, however imposing and altisonant, they will realize no more than the inquiring school boy aforesaid.

Thus we have reached the limit of the co-existences of spaces and bodies on the one side in antithesis to limitless space or zero on the other side, and we have reached the limits of times and motions in sequences from their definite periods in the past to the present moment; having their antithesis in the zero of the infinite blank and stillness and rest of eternity.

In other words, we have on one side the reality of bodies, their times and motions; on the other the unrealities of eternity and space.

We live and move and have our being in the real

universe. No part of our lives is caused or guided or influenced by the blank and void of eternity and space. All science and experience belong to the realities. They conduct us to the limits of the unreal and we never can possibly go further. But beyond the limits of sensibility and experience the metaphysicians have in their imagination seized on the region which we have truly labeled, **zero**, and there they have planted their postulates and essayed to harmonize the incongruous and contradictory attributes of their complicated deities.

The attributes required of a God superior to nature—and no God can be less—require that He or It shall be the Absolute, the Infinite, the Cause, the Unconditioned, the Unknowable.

These qualities, are mutually contradictory, and to a certain degree destroy each other, and so destroy the whole conception. The most subtile reasoning based on the boldest assumptions, fails to compel a reconciliation between the attributes of the Absolute and the **Infinite**. Much less to reconcile the real with the unreal, or science with religion—as we shall see further on.

CHAPTER XXVII.

No First Cause.

We have already touched upon the question of a **first cause**. The notion of a first cause involves the creation of something from nothing. This is inconceivable, preposterous in fact.

If something exists and if the said something could not be created from nothing, it follows that the something has always existed, never was created and therefore there was no First Cause. To form an idea of what a first cause would have to do, it is stated by astronomers that 100,000,000 stars are clearly visible through the largest telescopes; with another 100,000,000 dimly visible further off. Each of these represents a solar system with probably a brood of planets tagging after. Where do we come in? Is not the universe big enough, without being encumbered with a creator. The notion of proximate causes, of course flatly contradicts the notion of a first cause.

Spencer says, "We cannot think at all about the impressions which the external world produces on us, without thinking of them as caused." Very true. But when we think of them as caused, we think of a cause of the cause. We have never found anything that was not caused, and whenever we find the cause of such caused thing we immediately look for its cause. If we keep this up to infinity we shall never reach an uncaused cause.

It is true we see and naturally admit that everything has a proximate cause. Place us where you please in the universe and we would enquire the causes of the things we see. But for the very reason that we should find everything the offspring of a proximate cause, we should be effectually barred from even conceiving a final cause uncaused. The existence of everything on earth and much of the sky can be accounted for and its cause plainly traced. If we look backwards up the long road we

have traveled in the past we see the inveterate habit of Nature expressing itself in new forms from old substance. We cannot conceive a time when this habit became or could become a habit, from no habit. That nature has a self-perpetuating habit like that is a convincing if not a demonstrative proof that the growth of all things from all things has been assured from everlasting to everlasting; and no first cause was ever required or possible.

*Each one by his environment is pressed,
Coerced, transformed, and fashioned by the rest.
With wondrous art in atom, mass and mole,
The creature of an uncreated whole.*

The First Cause, Spencer says, must be infinite. Independence has no necessary relation to any other form of being and can have no necessary relation within itself.

The Infinite must extend without limits. What material is it composed of? It cannot be matter, for matter can not be infinite, nor extend without limits. It cannot be spirit, since in its capacity of first cause it would have relations with matter, which is impossible to spirit as it is supposed to be constituted.

As absolute, it is "perfect, complete, including within itself all power and transcending all law." To say the absolute has all power in itself and transcends all law is to assert that it has necessary relations both outside and inside of itself. To say it is complete and perfect is to judge and compare the Absolute, which brings it within relations and renders it finite, as mentioned before.

There are only three final hypotheses of cause:

"Self-existence, self-creation, and creation by external agency." The last two are not conceivable. * * * "We are obliged, therefore, to fall back upon the first, which is the one commonly accepted and commonly supposed to be satisfactory." * * * (P. 36.) "So that, in fact, impossible as it is to think of the actual universe as self-existing, we do but multiply impossibilities of thought by every attempt we make to explain its existence."

"Anarchon Ara Kai Ateleutaion to Pan" (without beginning and likewise without ending is the sum of all things).—Ocellus Lucanus, quoted by Goldsmith.

The positions that Spencer seems to take on this subject contradict each other. First, he admits the impossibility of self-creation; or a creation by a creator, and admits the proposition of eternal self-existence to be the most satisfactory; and yet goes on reasoning from a first cause as if it were proved and accepted.

Mr. Spencer makes persistence of force identical with the Absolute and his assertion that Force and the Absolute are without beginning or end, contradicts his hypothesis of a First Cause. If there is a first cause, before it went into the action of causing there could not have been any force persistent or otherwise, because force is co-existent and co-eternal with matter and depends on matter. If force is caused, it had a beginning. If it is identical with the Absolute, as Spencer claims, then the Absolute had a beginning, and if it had a beginning it is neither Absolute nor Infinite.

It having been agreed that creation of the uni-

verse by itself or by an external agency are both out of the question and that eternal self existence is the only tolerable hypothesis, the one involving the least violence to philosophy and common sense, whence comes the necessity of conceiving a first cause? We shall never see a first cause although we shall not be at a loss for proximate causes. The state of things of today is the result of the state of things of yesterday. As the universe is running itself and was delivered to us in full operation already caused, and possessed of the force to keep it going, we do not need to worry about the first cause. The conception of a first cause is incompatible with and is destroyed by a conception of self existence. We can discern in each present effect an immediate cause that went before it, and was itself an effect of a cause that went before it and so on ad infinitum.

Let our conception of this concatenation or endless chain include the most remote terms possible, we still see in every cause the pedigree and potency of the next effect, and blazoned across the face of every effect we read the history and necessity of its antecedent cause and discern its express image and portrait.

This concatenation bears within itself not only the history of its energies but the energies themselves. The conception of the concatenation here converges to the conception of the conservation and indestructibility and by consequence the uncreatability of matter and energy. The doctrine of conservation by necessity includes the doctrine of the catenation and vice versa. These two conceptions, cover the ground probably as completely as it can ever be done.

The conception of a First Cause involves the question, Where did he get his material? That it could be created from nothing is unthinkable.

What caused the first cause? is a question that would require an answer as pressingly as the one we started with, and leaves us as far from a solution as we were at the beginning. I here introduce from Spencer some extracts from Dean Mansel and Sir W. Hamilton, leading lights of the Church, whose exposition of the metaphysical view of these ultimate problems is the best possible from that side.

Mr. Mansel has three "conceptions." "The Cause, the Absolute, the Infinite, all equally indispensable, do they not imply contradiction to each other when viewed in conjunction as attributes of one and the same being? A cause cannot as such be absolute; the absolute cannot as such be a cause. The cause as such exists only in relation to its effect. The cause is a cause of the effect; the effect is an effect of the cause. On the other hand the conception of the absolute implies a possible existence out of all relation. We attempt to escape from this apparent contradiction by introducing the idea of succession in time. The absolute exists first by itself, and afterwards becomes a cause. But here we are checked by the third conception, that of the infinite. How can the infinite become that which it was not from the first? If causation is a possible mode of existence, that which exists without causing is not infinite; that which becomes a cause has passed beyond its former limits. Supposing the Absolute to become a cause it will follow that it operates by means of free will and consciousness. For

a necessary cause cannot be conceived as **Absolute** and Infinite. If necessitated by something **beyond** itself it is thereby limited by a superior power; **and** if necessitated by itself it has in its own nature **a** necessary relation to its effect. The act of causation must therefore be voluntary; and volition is **only** possible in a conscious Being. But consciousness again is only conceivable as a relation. There **must** be a conscious subject and an object of which he is conscious. The subject is subject to the object; the object is an object to the subject; and neither can exist by itself as the Absolute. This difficulty again may be for the moment evaded by distinguishing between the Absolute as related to another and the Absolute as related to itself." * * * But this alternative, he says, is no less self-destructive than the other. "The corollary from this reasoning is obvious. Not only is the Absolute as conceived incapable of a necessary relation to anything else; but it is also incapable of containing by the constitution of its own nature an essential relation within itself, as a whole for instance composed of parts, or as a substance consisting of attributes, or as a conscious subject in antithesis to an object. For if there is in the Absolute any principle of unity distinct from the mere accumulation of parts or attributes, this principle alone is the true Absolute. If on the other hand, there is no such principle then there is no absolute at all, but only a plurality of relatives. The almost unanimous voice of philosophy in pronouncing that the Absolute is both one and simple must be accepted as the voice of reason also, so far as reason has any voice in the matter. But this Absolute

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unity as indifferent and containing no attributes can neither be distinguished from the multiplicity of finite beings by any characteristic feature nor be identified with them in their multiplicity. Thus, we are landed in an inextricable dilemma. The Absolute cannot be conceived as conscious; neither can it be conceived as unconscious; it cannot be conceived as complex neither can it be conceived as simple; it cannot be conceived by difference; neither can it be conceived by the absence of difference; it cannot be identified with the universe neither can it be distinguished from it."

"The Absolute and the Infinite are thus like the **Inconceivable** and the Imperceptible, names indicating not an object of thought or consciousness at all, but the mere absence of the conditions under which consciousness is possible." Thus far Dean Mansel.

Now a line from Sir Wm. Hamilton: "The Absolute is conceived merely by a negation of conceivability."

Mr. Spencer admits the logical soundness of the reasoning in these extracts and granting the premiss from which the argument starts, the conclusion is unavoidable that "we cannot rationally affirm the positive existence of anything beyond phenomena." It must be an exceedingly weak cause that starting on an unlimited license of postulates cannot be made to "land" the philosophers somewhere else than in an "inextricable dilemma."

I have already given a synopsis of Herbert Spencer's unique argument based on a new premiss of very doubtful validity. The fact is, these gentle-

men were under an embarrassing necessity to procure a divinity endowed with certain supernatural attributes. But they could not locate this being inside of the relative without making him finite; and they could not place him outside for the same reason. To be infinite he must be both relative and non-relative. They could not impose on him the functions of a first cause without destroying his attributes of the Absolute and the Infinite.

In his capacity of first cause he must have had a beginning before which he was not a first cause and at the end of his task he ceased to be a first cause and is therefore no longer infinite. His activity as first cause must have ended with the creation of the things he caused; otherwise it would have to be assumed that he is still engaged in first causing things over and over, or *ab initio*. But this would contradict the persistence of force. But on the other hand if he is not so engaged we would have to consider him as one who was a first cause one time in the remote past, but is so no longer. He has therefore, changed and has become differently functioned and differently occupied. If he was infinite before he is less than infinite now.

We may ask why did he begin to create? How many ages did he exist before he began? Man is made active by a feeling of uneasiness. In an infinity of time did the Absolute become uneasy? When he ceased, why did he cease? Because he was out of material? If so, he was not a first cause, if he were he would create the materials from 0. Things make themselves when materials are present. Did he quit because he was exhausted? If so

he is not infinite. If for any reason he began or for any reason he quit, he is under the domination of a necessity and therefore not absolute. Whatever motive he had for doing anything or of refraining to do anything, such motive governs him and is the real absolute for the moment.

We have got to conceive the Absolute First Cause as acting in the absence of motives and without motive or reason. Otherwise he is an automaton like a man or a horse, and his motives are his master, as they are with us. But the first cause cannot, any more than a man, be conceived as acting without motives. But to be thus conceived or to be conceived in any wise whatever is to be placed in relations and shorn of all attributes. The conception of a First Cause contradicts Spencer's assertion of the identity of the persistence of force with the Absolute, and of the eternity of each—without beginning or end.

CHAPTER XXVIII

The Absolute Considered as Unknowable.

Knowledge is the sensation or perception we get of an object outside of our psyche by the reflection or projection upon the psyche of energy from such object. We do not have any knowledge except at the expense of force or energy and our knowledge is a mode of energy and a continuation of the energy

projected or reflected from such object directly or indirectly. It can readily be proved that we are in some visible relationship with many parts of the universe, and receive impressions and consequently acquire knowledge from them. Now anything is knowable that can project or reflect energy upon us so as to affect our psychic substance. If it cannot do this, it is unknowable. Now if Spencer is right about the Absolute, etc., being unknowable, it turns out that the Absolute, the source of all power, has not the power to project upon us any of the sorts of motion that are adapted to the creation within us of the motion knowledge. He, She or It cannot send to us sight, hearing, feeling, tasting or smelling stimuli. Nor is the Absolute able to convey knowledge to us by way of the telepathic sense or inspiration. The unknowableness is up to him, not us. As regards knowledge we are passive, receptive, in the objective case. Knowledge is not the result in the first place of what we do, but what is done to us. The sound, sight and pressure stimuli are hurled by outside bodies not pulled in by us. We stand in the same relation to the Absolute, that the rest of the universe does. And if he is unable to make himself known to us he must be equally incapacitated from communicating with the rest of his creation. But since knowledge is a continuation of physical motion, and is exchangeable with all other forms of energy it is not possible that any power or source of energy or being that reflects energy can be called unknowable.

It may seem extravagant to assert that in acquiring knowledge, we do nothing of ourselves, but are

passive or percipient only. This statement so far as it refers to the psyche seems plain enough. For it is obvious that our knowledge is only the effect, continuation and automatic elaboration of stimulations that come to us from outside objects. We see the sun by the undulations of the ether that the activity of his photosphere sets in motion, and projects toward us. We see the moon by means of other of the same solar radiations intercepted by the moon and reflected to us. All objects that we see by daylight are seen in the same way by the reflection of solar rays from such objects. Our part in all this is simply to keep our eyes open. And they are kept open or not according as the psyche directs, and that means according as the other activities of the moment, require or prohibit such seeing. If they do require it they will cause a will to be formed that will operate the muscles necessary to keep the sensory organ and the afferent apparatus in a receptive condition; that is, in a state of attention. As the case becomes more complicated and the individual becomes animated by a purpose, it does to the superficial observation, appear as if the subject were originating efforts for the acquiring of knowledge. Suppose, for example, one is reading a book. The light is insufficient and he moves to get more. He has a deliberate purpose. He is imbibing knowledge by the energy of the solar rays reflected from the pages of the book. He is under the domination of a purpose to do this. But what is a purpose? It is a strain or a position of potential energy induced by the composite and mutually limiting stimulations that may be dominant at the

moment, the liberation of such strain and resulting motor activity depending on the further stimulations that may relate to time, opportunity, manner, etc.

Thus, the purpose not immediately carried out, is nevertheless as much the product of the environment as the simplest sensation. So when our subject moves into the sunlight to read his book, we know he does it like a conscious automation under the domination of stimulations that were projected upon his psyche, possibly days, months or years ago. Our knowledge, therefore, depends on—is, in fact—the activity of bodies outside of us conveyed to our psyche by way of our sense organs and nervous system, and any body is knowable that can do this. Every body in the universe can do it or cannot help doing it. And every physical body is knowable. If the Absolute is unknowable, it is because he is not physical. If he is not physical, and therefore not competent to resist and intercept or reflect or project physical energy, he could not have created the universe and imparted motion to it. But since he is thus limited he is not absolute, and the conclusion of the whole matter is and must be, there is no absolute, no unknowable.

But the Absolute, the unconditioned, the infinite, is, after all nothing but a postulate, an assumption, a guess. And according to Spencer's own showing an entirely superfluous guess. Even granting that by any system of philosophy, we must have a postulate to begin with, let it be first, one that will help us to a better understanding of the universe and our relation to it; second, it should be something that

accords with our present stock of knowledge and ascertained science. A postulate that Spencer appears to entertain is that the universe never had a beginning, but always was. He does indeed say that it is impossible to think of it as never beginning, but all explanations make it worse. Now, suppose an infinite absolute being to be the author of it all, is that proposition any more thinkable or does it elucidate a single problem? We know, if we know we exist, that the universe exists now in working order. We know of no cause that could probably have brought it into existence from nothing 2,000 years ago or 8,000 years ago or any other period of time ago. If we could go back any number of millions of ages, can we imagine any reason why the stars, suns, planets, comets and nebulæ were not then whirling through space much as they do now, making allowance for the normal changes that characterize all moving things. We find all nature in the act of existing and moving. We see no superintending power directing her movements, and to all appearances they will continue in the future indefinitely. We judge the past and the future by the present. This is all we can do and imagining an unknowable unconditioned being to have always existed is no easier than to assign no beginning to nature. Science has settled the indestructibility of matter and of its motion, and that equally applies to its uncreatability.

Reason inductively from what we know, viz., that the universe exists, and applying to that fact the principles of the conservation of matter and its motions the present order is without beginning or end.

The burden of proof against this conclusion rests with the metaphysicians. They must show why there must have been a beginning. They must show how matter in motion originated or was caused to exist as a sequel to, and at the expense of 0—**nothing**.

If there is an unknowable we must be forever debarred from knowing that to be a fact, because that or any knowledge depends on a projection of energy and an unknowable is a non-projector of energy.

The whole assumption is without warrant or even argument—wholly baseless, gratuitous and fatuous, illogical and impossible, and worse than all, totally useless.

I quote again from Spencer, P. 81. "A cognition of the Real as distinguished from the Phenomenal, must if it **exists** conform to this law of cognition in general. The First Cause, the Infinite, the Absolute, to be known at all, must be **classed**."

That is, it must be classed to bring it under the rules of the relativity of knowledge, under the assumption that all knowledge is comparative. "That which is uncaused cannot be assimilated to that which is caused; the two being in the very naming, antithetically opposed.

The Infinite cannot be grouped along with something that is finite; since in being so grouped it must be regarded as non-infinite. It is impossible to put the Absolute in the same category with anything relative, so long as the Absolute is defined as that of which no necessary relation can be predicated." * * * "There cannot be more than one

First Cause, seeing that the existence of more than one would involve the existence of something necessitating more than one, which something would be the true First Cause. How self-destructive is the assumption of **two** or **more** **Infinities** is manifest on remembering that such Infinities by limiting each other would become finite. And similarly an Absolute which existed not alone, but along with other Absolutes would no longer be an Absolute but a relative. The Unconditioned therefore, as classable neither with any form of the Conditioned nor with any other Unconditioned, cannot be classed at all. And to admit that it cannot be known as of such or such kind, is to admit that it is Unknowable." (The italics are mine.)

By the law of the relativity of knowledge, a thing that cannot be classed, cannot be known, and is therefore pronounced unknowable. And so the Absolute, the Infinite and the Cause being unclassable, are unknowable according to Spencer. Dean Mansel, Sir Wm. Hamilton and Mr. Spencer, all, would have us think that the proof of the unknowability of the Absolute is no proof of its non-existence. They say they believe it exists, but its existence is not conceivable, and not provable.

All the knowledge we have of things is thrust upon us by the things themselves, in the transfer of motion from them to us. If an unknowable exists destitute of the ability to transfer motion to us, it is a mere dummy. If we assume the things in the natural world about us to be "manifestations" of the Absolute, and assume the Absolute to be unknowable, it follows that the fact of the origin of the

"manifestations" is likewise unknowable, and that we never can know them, as manifestations of the Absolute.

The Absolute is therefore to us simply zero—nothing at all.

By establishing a relationship between the Absolute and these manifestations, the unknowability of the Absolute is destroyed. Spencer says the Absolute is related to Nature as cause to effect. That is, the First Cause created things from nothing. Spencer himself shows this proposition to be untenable, and it is in direct hostility to the doctrine of the persistence of force which, as already mentioned, Spencer pronounces the most stupendous and vital verity in all philosophy.

I have shown elsewhere that there are other conditions of knowledge beside mere classification. But all ways require the projections of force from the knowable object to the percipient or subject. That the Absolute and Unknowable never do this, demands the conclusion that they are destitute of the ability to do it. That is, we have this **negative** proof that they do not exist.

In the assertion of the Absolute in the capacity of First Cause making all things from nothing, we have in the direct collision between the hypothetical First Cause and the a-priori principle of the persistence of force, a **positive** proof that the Absolute does not exist.

Spencer postulates the persistence of force as **being** the Absolute, **without beginning or end**. But in that case, what becomes of the **First Cause**? If there was no beginning there could never have

been a **First Cause**. If there was a beginning, persistence of force is a myth, and cannot be associated with the idea of an Absolute.

The conceptions of the unknowable, the unconditioned, the Absolute, are mutually destructive of each other and are totally irreconcilable with the homely quality we call common sense, which is, after all, the final arbiter and the court of last resort.

Spencer says the knowable is a manifestation of the unknowable. In that case the unknowable is not unknowable for it has performed works and created "manifestations." We can judge it by these manifestations and acquire some knowledge of it. We are in touch with the knowable, and the knowable, according to that, is in touch—and in intimate touch—with the unknowable. This brings us within only one remove of the unknowable and enables us to learn a good deal about it, but by so much it reduces the unknowableness of the unknowable and contracts the volume of that "nescience" so essentially the foundation and structural frame of religion. But it brings us nearer than that to the unknowable, for we must consider that we ourselves are component parts of the knowable and as such we become ourselves "manifestations" of the unknowable. So that in reality there is nothing at all between us and the unknowable; but we occupy the relationship to each other of product and producer. This is what Religion has all along claimed and Spencer officiously representing science yields the whole contention. But science never agreed to this. Science affirms that we are the

products not of an unknowable, but of knowable causes. We are able to take up the threads of the wonderful web of which we are a part and trace them back through a series of effects and causes all knowable and all material, our quest bounded indeed, by our powers of endurance but never by a barred gate with the warning sign, "Keep out. This is the entrance to the unknowable."

By the expression that the universe is a "manifestation of the unknowable," I take it is meant, that it was created by the unknowable out of nothing. Now it is not logical that an unknowable could be a creator. The moment he begins to create, he abdicates his lofty and inscrutable hiding place, and exposes himself to the gaze of the universe. Only let Spencer's assumption be made good, viz., that things are creatures of the unknowable and it immediately follows that he is no longer unknowable. He has become a wielder of energy, and whatever or whoever dispenses force and inaugurates motion, whether as a first cause or only a link in causation, cannot either in fact or philosophy be classed as unknowable, for his works do surely betray him.

But, I hold that no sort of a being knowable, unknowable or Absolute can or ever did or could create something from nothing.

Now consider the scope and significance of this term, the Absolute. The word means unhampered, unhindered, unconfined, unconditioned. But if the Absolute is unknowable, he or it, is hampered and hindered. Consider what he is barred from doing because he is unknowable. He cannot, like the sun,

emit light of his own make, nor like the moon, reflect light that might originate in some other body. If he did, he would run the risk of being seen and perhaps analyzed by the spectroscope. He would be barred from making such agitations of the atmosphere as convey to us the sense of sound, or fill it with odorous particles of matter by which our olfactories might be agitated. Nor could he correspond with us by telegraph or telephone. If he were really Absolute, he could put a message on the wires for us every day without the assistance of any operator, or he could use the wireless principle and dart instructions, warnings and greetings across the abyss of the sky without the risk of being misunderstood or misrepresented, or he could press upon us and convey a sense of his existence by our inertia of resistance. Or he could use our telepathic sense and convey intelligence to our brain without halting for the co-operation of the external sense organs.

But since he is **unclassable**, and therefore unknowable, he is **incompetent** to reflect or project upon us any of the forms of physical energy above mentioned. To say that he is competent, but does not wish to be known does not constitute him unknowable, he must be unable and incapacitated for the transmission of energy. A hermit may live in a cave away from society all his life and always remain unknown, but that would not make him unknowable, for he has the qualities of resistance, extension and motion that would make him known to any being competent to be affected by physical energy.

Likewise, the Absolute to be unknowable must be destitute of all forms of energy, and of all the qualities of matter such as resistance and extension. If the Absolute created the universe, he must have imparted to it the energy with which we see it endowed. If he possesses energy, he is competent to communicate some of it to us, thereby creating knowledge in us. If he can do this he is not unknowable. If he does not possess such energy he is limited and is therefore not Absolute.

But if he possesses energy and is knowable, he is in principle only on a par with the sensible universe, which is likewise possessed of energy, and is knowable. If he does not possess at least all of the energy of the universe, he is not Absolute or Infinite. If he has created the sensible universe and has endowed it with the energy it has, he has by that much reduced the stock he had and is therefore limited and not Absolute.

But in short, there can be no such thing as an Absolute if there is anything else.

There is something else, therefore there is no Absolute.

All this talk of an Absolute is destitute of any basis of logic or science.

Is the unknowable reduced by the inroads science is constantly making on the stock of "Nescience" the metaphysical doctors still have on hand?

CHAPTER XXIV.

Spencer's Reconciliation.

On the first page of First Principles (the Preface) Spencer says, "There is a united belief in an Absolute that transcends human knowledge and human conception, and in this belief lies the only possible reconciliation of science and religion." In reply, science has nothing to do with that which is beyond the scope of possibility of human knowledge, so it has no belief "united" or otherwise in an Absolute. Spencer's animus appears to be, to effect this reconciliation by having science surrender its position of investigation and swarm over to religion on the strength of its "united belief" in its own central article of faith. Reconciliation is easy when one party can be compelled by force to surrender to the other. The Absolute, science knows nothing about and has never discovered or acknowledged.

Spencer says the Religious Sentiment "is created by the slow action of natural causes." Admitted. But so were many other false ideas that had at first some points that harmonized with human requirements, but which as a whole had to be outgrown and totally relegated to the waste basket. Such as witchcraft, the Ptolemaic Theory, Pantheism, Greek and Roman Mythology, the Tail, Appendix, etc.

"Religion under all its forms is distinguished from everything else in this, that its subject matter is that which passes the sphere of experience"; it is "that which transcends knowledge." There is a sphere,

he says, for the exercise of this sentiment in "that nescience" (ignorance) "which must ever remain the antithesis of science" (P. 17).

Now, according to the above, religion can never become a science, since it lives exclusively on the nescience that science has not been able to dispel. Religion and science are diametrically opposed. Science is only knowledge experienced and demonstrated. Religion professes to be founded on a subject matter, that is superior to knowledge and therefore does not admit of demonstration.

Science does not admit the superiority of nescience over knowledge. All her operations are for the purpose of reducing and destroying nescience, and putting knowledge in its place. As this process continues, the result must be in time to eliminate all the nescience possessed by the religious cult, and turn it over to science, **except** that part of religion whose subject matter is the unknowable. All the real facts religion has now, or will fall heir to in the future, will become the property of science; all the superannuated and moss-grown fictions and fancies that like so many barnacles have fastened themselves on the body of religion will have to be scraped off and cast behind like the other kitchen leavings of the past. What will be left for religion? Nothing at all. Such a conception as Mr. Spencer's Unknowable cannot bind together a body of people. Doubtless church organizations will be kept up for their social, ethical, and moral value, but worship addressed to a dead man, or to an unknowable myth, will but court the ridicule of the ages. As to science ever being found in such company, it is out of the question. Science has thousands of times

in the past, and will thousands of times in the future, **run against** tough propositions. Before science tackles a proposition she must **run against** it. A proposition that cannot be run against (like the Absolute), or in other words, has no resistance, is no proposition at all. Science cannot touch it. The Absolute as conceived by metaphysics is perfectly safe from the assaults of science; and equally safe from the attention of religion. The "united belief" of science and religion in which they do tacitly agree appears to be, that the conception of an unknowable absolute, inaccessible and unintelligible, is without foundation as a fact, and without utility as a postulate.

The kernel of religion, according to Spencer, is that it "has everywhere established and propagated one or other modification of the doctrine that all things are manifestations of a power that transcends our knowledge." If it be admitted that this belief is universal, which it is not, it would not follow that it is true. It cannot be proved that all things are "manifestations" of a power behind them. There are no manufacturer's marks that identify them.

Such identification includes the assumption of a first cause and the creation of the universe from nothing, both of which propositions are admitted even by the metaphysicians themselves, to be inconceivable. They say "The Absolute and Infinite cannot be conceived in any way without fatal contradictions."

Spencer says, "If religion and science are to be reconciled the basis of reconciliation must be this deepest, widest and most certain of all facts, that

the power which the universe manifests to us is utterly inscrutable."

How can the mere quality of inscrutableness be deeper, wider and more certain than the absolute being itself? It would seem it has no other quality except inscrutability.

"Manifestation" in connection with such a being is a misnomer. If it could manifest anything, it would not be inscrutable. But the fact that the universe exists, while the absolute does not, so far as we can discern, is proof that the facts of nature are not mere "manifestations." Is this inscrutableness all on our account, or are there others? Certainly science has nothing to do with it.

But neither is religion "reconciled." The term religion itself means a bond or tie, presumably a vow of obligation to a god. Now what obligation or sense of obligation can be possible to a man, to bind him to an unknowable; a something he cannot by any possibility know anything about?

To assert that the unknowable is pleased with the homage and worship of mankind is to assert that we know something about him, and that at once destroys the very foundation of the new structure that it is proposed to be raised.

Religion addresses itself to the imagination and to the emotions. The proposition of an unknowable precludes both of these. By its very terms we are forbidden to imagine the unknowable, and there can be no tie that can either bind us to it or awaken towards it any sentiment or emotion that is possible to the human soul. Religion such as we have always had it, is founded ninety-nine-hundredths on emotions of fear and terror of an offended and irate

master on one side, and on the other side, on the love and affection of a fond and merciful father.

To assert that there is no god that exhibits or is subject to or limited by emotions, one that is never either pleased or angry, one that does not care whether he is worshipped or not, one who does not answer prayer and will not interfere to save you from torture or death, nor send the rain necessary to save a million souls from famine, to maintain that God is not full of sympathy, kindness, and mercy, as well as stern retributive justice—to assert this, is the same as bald atheism. But this the doctrine of the unknowable-absolute does.

Collins—Spencer.—“In brief our postulates (assumptions) are—An unknowable power; the existence of knowable likenesses and differences among the manifestations of that power and a resulting segregation of the manifestations into those of subject and object.”

Thus, he starts his whole philosophy on assumptions unsupported by science or fact, and yet proclaims science to be pleased with her new alliance.

Spencer's reasoning is metaphysical instead of scientific, and deductive instead of inductive. He assumes his postulates for the foundation of his argument on the outside of the universe instead of in it. His assumptions do not fit the actual facts of universal existence.

We are obliged to dissent from his whole theory of force, power, the absolute, space, and time. On some points he seems to contradict himself. The postulates he deals with are each one equal to 0 and after all his elaborate mysticism 0 is what he gets

for his answer and by his own admission he has solved nothing.

He makes space and time to be "relative realities," and bases arguments on them as such.

He says: "Our conception of matter reduced to its simplest shape, is that of co-existent positions that offer resistance; as contrasted with our conception of Space in which the co-existent positions offer no resistance. Thus experiences of force underlie the idea of matter. Such being our cognition of the relative reality what is to be said of the **Absolute** reality? We can only say that it is some mode of the Unknowable, related to the matter we know as cause to effect." * * * "We come, then, finally to Force as the ultimate of ultimates." "Getting rid of all complications, and contemplating pure Force, we are irresistibly compelled by the relativity of our thought to vaguely conceive some unknown force as the correlative of the known force."

Now, note that the "co-existent positions" of space "offer no resistance." Space is thus proved to be nothing at all. Real things offer resistance and reflect energy.

Experiences of force alone do not underlie the idea of matter, but experiences of **matter in motion** give rise to the idea of force. Our first real experiences consist of nerve currents and blood currents, and these are matter in motion.

What is "pure Force"? The "complications" to be got rid of are doubtless the vulgar associations of "pure force" with matter. It would be interesting to know what pure force, detached from matter, would be like.

Force is the energy or power for work or pressure of a **body in motion**. There is no other force. If the **body**, the **matter**, don't move, there is no force.

He is irresistibly compelled to vaguely conceive some unknown force as the "correlative of the known force." Do forces have doubles? For each force manifested, working in the open, is there another that keeps in the dark? If so what does this dark one have to do?

We can learn approximately the history of the forces of the accessible universe and we find none that requires to be explained or that can be elucidated by the assumption of an unknown correlative force. The mere "united" belief in an unknowable, is not a sufficient basis for a reconciliation. And in fact, Spencer is asking more of science. He has appropriated the "persistence of force," without leave.

Force is not the "Ultimate of Ultimates." It is needless to say that in a universe without beginning or ending, where there is neither loss nor gain, of either matter or motion, there can be no ultimates. Every effect is equally a cause—nothing is first and nothing last.

Spencer's reconciliation does not reconcile. He attempted to compensate Religion for the loss of her old time lord, the stork; by presenting her with an unknowable log. But she is no better pleased with it than were Æsop's frogs. And who will go on a bond to restrain science from laying violent hands on that log and reducing it to fuel for his furnaces and retorts.

Spencer was himself fully aware of the inadequacy of the so-called "reconciliation," at least, for im-

mediate use. On p. 113, *First Principles*, he says: "An immense majority will refuse with more or less of indignation, a belief seeming to them so shadowy and indefinite" * * * "You offer us," they say, "An unthinkable Abstraction in place of a being towards whom we may entertain definite feelings. Though we are told that the Absolute is real, yet since we are not allowed to conceive it, it might as well be a pure negation. Instead of a power which we can regard as having some sympathy with us, you would have us contemplate a Power to which no emotion whatever can ever be ascribed. And so we are to be deprived of the very substance of our faith."

Spencer's conclusions putting God further off is **destructive** of Religion. Religion is a supposed binding together, especially by means of the emotions, love, gratitude, affection, fear, reverence; a binding closer, a drawing nearer, and supposes a reciprocity on God's part. All this implies a God not far off. But Spencer's system banishes all the near-by gods, and traces back our supernatural relationships to a being afar off, an unknowable Absolute abstract, with which it is impossible to have any relationships of any kind. A being without love or interest toward us; unknowable, and forever beyond our reach without relations, without religion.

Spencer's scheme is to put the "First cause, Infinite, Absolute" the Unconditioned, at the head of affairs above all gods, and banish them; no rational worship could be addressed to such a being not related as it is, having no love, mercy, hate, anger; indifferent to suffering, to worship, to prayer.

No priesthood could make a living out of rela-

tions to the thus unrelated— consequently, no one would find any inducement in accepting an agency for such a cult.

CHAPTER XXX.

Ethics.

Professor Woodbridge, in his lectures before the Summer School of teachers, Aug. 9-13, 1897, on the subject of "Ethics," advanced some propositions that will serve as my text in treating this subject.

1. He held, that the final motive and end of ethics is the good of mankind in general, including the individual whose action is in judgment as to its moral or unmoral quality.

2. Therefore, hedonism is superseded by "duty," as a motive and end.

3. Men are not born to "rights," but to duties, and they get rights upon the performance of duty, and they have no rights if they perform no duties.

4. Might does not make right—at least for an individual as against society.

5. "It is to be admitted that there has been an evolution of Ethics, but it does not follow and is not true that ethics was begotten or created by evolution.

6. "There is a dualism in nature. Evolution depends on Matter and Motion as original factors, and without them Cosmic evolution could not have taken place. The evolution of the internal or subjective

side of ethics, that is, the individual **sense of duty**, must have had a point to start from, not created by evolution—therefore not from Matter and Motion, unoriginated and therefore immortal. Duty is defined to be that which is **due**; that which we owe.

There are two aspects from which actions are judged. The first relates to the Conscience and the sense of duty of the individual actor, and his action is judged to be moral if his motive is good and vice versa. The other aspect relates to the effect of his action outside of himself. The action is good from this point of view if its results are good, regardless of the motive. But it is to be observed, that the quality of morality, the ethics of the case, is solely with the first aspect. The **effects** of an action are neither moral nor unmoral; only the motive. Therefore we judge the individual by his subjective state. Now it is not conceivable that a man or a beast, or a god, devil, or angel, could act at all except to avoid pain or uneasiness, or to attain to a state of less pain graduating into pleasure or happiness. It is generally admitted and was admitted by Prof. W. that this is the only Motive for all purposive or intelligent action up to the point where it is superseded by the ethical sense of duty. Those actions that are automatic, reflex and instinctive do not count as purposive and are not consciously performed for the purpose of avoiding pain or giving pleasure; although it would not be easy to show that the habit of their performance did not originate as means for the avoidance of uneasiness; they, in many cases, being no more than vents or waste-gates for an over-production of nervous energy.

Their forcible restraint or suppression would speedily be productive of a very conscious uneasiness or pain. Now, the question is, does the introduction of duty as a motive modify the principle that pain and pleasure are the only Motives? I hold it does not, for when a sense of duty has become incorporated among the mental motives of an individual, it is because of an accompanying conviction that the performance of such duty will be productive of less pain than its avoidance—in the long run. The imposition of a sense of duty upon a man comes from his environment—his family, his friends, his neighbors, the community in which he lives, his domestic animals, the game he hunts in the woods and the fish he catches in the waters. Now it is easy to show that the end to which these several duties lead and point is right in the individual himself. That end is his own pleasure or happiness. This they distinctly point to and the duty that does not thus end is no duty at all and never becomes such. I use pleasure here not merely to mean positive enjoyment, but also the condition of least pain. A pleasure may be positively painful, but relatively less so, than some alternative possible state. When a person performs a "painful duty," as when a parent chastises a child, it is nevertheless less painful than the neglect of such duty would be. All our duties are laid upon us on that principle by the forces in our environment, and they are urgent or imperative in proportion to the amount of pain these forces are able to inflict upon us for their neglect. We must do them or do worse; and unless their neglect is worse than their performance they are

not duties. To say, therefore, that the end of duty is the good of mankind does not properly state the case. We do not owe duties to the whole of mankind, but only to the portion with which we are related and this portion is usually confined to our relatives, friends, and fellow citizens. Our lives are too short and too circumscribed to admit of relationships and obligations with all the world. We have less to do with people in most foreign countries than we have with our domestic animals, and we owe them less of duty. But why do we owe duty to our domestic animals? Simply because a neglect of their welfare reacts to bring us reduced benefits from their use. To those animals from which we get no benefits, we acknowledge no duties, but ruthlessly put them out of our way and dispose of their lives according to our own interests. What we call duty to the lower animals is therefore nothing but our own interest or pleasure subserved indirectly by such treatment of them as will make them most useful or agreeable to us. This may include such considerations as those of friendship that often exists between a man and his horse or his dog. Our duties toward mankind depend on the same principle. We are social animals and depend upon each other. If parents did not take care of their infants, the race would perish in one generation. If we did not stand by and support each other through life, we would become the wildest of wild beasts, for almost all tribes of the lower animals are social and mutually helpful, and could not otherwise exist.

Moreover, we often find our greatest enemies amongst our own race, sometimes among our own

family and relatives. Ordinarily we make a distinction between our friends and our enemies and I think we ought to. This accords with nature and is a sentiment developed as one of the incidents in the progress of the evolution of the fittest. Our duties diverge and are mixed with uncontrollable conditions, and factors of a personal nature, change the personality in any given case, and the resultant burden of duty is shifted, and duty changes.

We are in the habit of using the term duty as if it implied something within our control and choice. In reality, our duty is our necessity and varies as it does.

Our duty to any other, either beast or human, depends on our general or special relationships with them.

If it be said that we owe assistance to any human being, therefore to every one—by virtue alone of his or their humanity such position may be justified on the assumption that the race is composed of units that are able to help each other and are therefore under a tacit partnership by virtue of which any assistance rendered to anyone by anyone becomes a credit in his favor to be repaid on occasion. This is in antithesis with the case in which a criminal by injurious action against another becomes a debtor to society and is made to pay a penalty in loss of liberty or property. Duty is largely influenced by the personal factor. An action that duty requires of one man is not expected from another. In distress we do not look for succor to a horse or pig or idiot or small child.

No such thing as duty, as commonly understood,

exists. We do what we have to do. All our motives are at last resolved into hedonism—the compulsory pursuit of happiness; and the compulsory avoidance of pain. Duty then is a detail and a subdivision of hedonism and a principle of the second degree.

Prof. Woodbridge's position denying the origin of the sense of duty by the process of evolution is untenable. Every one of our functions has been the subject of a slow and progressive modification from a small beginning.

He says the sense is "unoriginated and therefore immortal." A sense of duty is not a thing, but is the name of an action or motion of the psyche or soul and therefore could not have existed before there was any soul. The sense of duty, although early in the animal tribes, cannot be supposed to have been among the earliest senses of which there are many, incident and tributary to their development. But it is certainly not unoriginated.

Even admitting the theory of the immortality of the soul, the immortality of the doings, actions and motions of the soul—its thoughts, its feelings and sensibilities—cannot be admitted. Still less, since the soul, itself, is mortal. The sense of duty then originating as early as animal tribes needed each other's assistance, or co-operation, proceeded in association with other instincts upon which depend the furtherance of the race; especially the functions of reproduction. No sense relative to these functions could come into existence until the exercise of them required the co-operation of two individuals. This could not happen before the evolution of the

sexual animals from the asexual and hermaphrodite animals had taken place. Before this time there was nothing in the nature of association or co-operation that was required in their lives. They were provided with sustenance by the element in which they lived. No effort was required for their own living, much less was there any demand for assistance to others. Therefore there could not be among these lower tribes a sense of relationship, much less a feeling of duty. It is indeed doubtful if there be even a feeling of attachment or fellowship among the animals lower than mammals and birds, possibly excepting some of the articulates, such as ants and bees, the sphex, etc. The provision the latter makes for her young in paralysing another insect and placing it in the hole in which she lays her egg, to be eaten by her offspring as soon as it is hatched from the egg, is an instinct such as might develop an uneasy sensibility of something missing or something wrong if it were forcibly prevented from exercising its habit. And a sense of duty as we have it is nothing more than an immensely expanded instinct for doing something toward which the environment urges us on, and from which she holds us back. So far from a sense of duty or, any other sense for that matter, being unoriginated there must have been several origins, developed on different lines. We find at the bottom of the mammal class amongst the Monotremes and Marsupials the organization of the family, an early fact. From these up to man are the constantly widening communities of acquaintances, friends and enemies. There is constant enlargement of the circle of relationships of sympathies

and antipathies. All these affections developed by the action of the environment upon the very low but not the lowest of animal life reach their culmination in man.

But after all do we not do something for our fellows in which self is not taken into account?

We do things unthinkingly, unhesitatingly, without regard to consequences, in short, instinctively upon a sudden impulse requiring quick action with risk to ourselves where a fellow is in imminent peril.

Yes, sympathy and pity may become hereditary and instinctive, so that to rescue one in danger becomes a second nature. To restrain this second nature is as painful as to thwart our natural sensibilities.

The addition of these second-nature Motives reinforcing in the same direction, those whose influence and bias are already formed, works no modification in the action from what it would have otherwise been, but only adds to its force and amount. In short we cannot violate these various tendencies to apparently disinterested action, without more pain than to take the risk of thwarting them.

Nature has delegated to society a very large share of her power to benefit, injure, punish, rule and regulate the individual. Like every other governing authority, society looks first to her own interests and second to those of the governed. We can almost count on our fingers and toes, the rules and regulations, maxims and constitutions she has promulgated to secure the individual from her own encroachments; but consider the appalling list of principles the old hussy, selfish, crafty and thrifty,

pragmatical and tyrannical, yet motherly withal, has laid down and registered for the governance of the individual as mentioned in a former chapter.

Laws, creeds, codes, dogmas, prescriptions, precepts, fashions, customs, standards, patterns, rules, ordinances, doctrines, signs, traditions, legends, proverbs, fables, histories, facts, fictions, admonitions, rites, ceremonies, games, rewards, punishments, tastes, etiquette, morals, philosophy, science, dominant ideas, aphorisms, maxims.

From the cradle to the grave we are hedged about by these ready-made principles and a large part of our lives is spent in trying to learn what they are, and the rest of it in a vain endeavor to regulate our conduct in accordance with them. Society says to us, thou shalt do this, thou shalt not do that; pay your taxes, work the roads, keep off the grass, go and vote, "talk proper" as I talk, spell as I spell, wear my cut of clothes, go to church, believe one of my creeds, keep my holidays, observe my precepts, read my favorite authors, adopt my standards of taste in art and criticism, and my rules of etiquette and deportment.

If you do everything as I tell you, conform to all my laws, adhere to my customs, and flatter me by adopting my advice and admiring my wisdom, you will still be an unprofitable servant, but I will allow you to work for your living if you can find anyone to employ you. If you cannot you are after all a miserable tramp, and must move on and get off the earth as soon as possible. But mark you, sirrah, if I get into trouble with a foreign power, I claim the right to draft you and send you to the war to be shot for my benefit.

Both nature and society are chary of rewards, but prodigal of punishments. Society indeed may be said to bestow no rewards at all. She allows her favors to fall indiscriminately, but much oftener on those who have injured than upon those who have benefited her. But she is guilty of the rankest favoritism. And she is cowardly and truckling in spite of her truculence and she allows the bold, the selfish, the greedy and the unprincipled to plunder and rob her and nullify the most of her pet principles often without punishment or even with sympathetic excuses and extenuations.

The fact is the hypocritical old virago has fewer real principles than she pretends to have. She will forgive a lie told for her benefit, but punishes the man who tells one for himself.

Doubtless, no other race of animals takes life so hard as we do. Certainly none other has so many rules to observe, so many fetters to wear, so many narrow paths to tread, so many pains and penalties to avoid, so many regulations to be governed by. In short, we are under a government by pain, and nature knows no way to make us move except to prod us like an ox with a goad. If before his entrance into the world every individual should be endowed with a moment of wisdom and a glimpse of the mountain range of regulations under the domination of which he was fated to pass, would any human being have the courage to be born, if he could help it? Not one!

Now by all the means in her power, by the kindergarten, the school, the university, the newspaper, the library, the Sunday school, the church, the court,

the prison, society endeavors to inject into us the rules by which she wishes us to be governed. This is done by teaching them to us, preaching them to us, and giving us object lessons of the effects of the observance or the disregard of them. These processes acting as sensory stimulations like those described above, differentiate portions of the soul substance, which portions thereafter are organs of such principles, and when restimulated reproduce the feelings or sensations of the fact or being of such principles.

The history of the origin of these principles does not accompany them as a general thing, and if we would seek a reason for their being, we must try them by the results of their action under present conditions. But society is very conservative and impatient of change. Most of her principles have been handed down from the past, and she wants them accepted on faith without question as she took them. She takes advantage of the plasticity of callow youth and infancy to graft upon the tender psyche her principles at a period in life, at which her authority and wisdom are not called in question and when a stimulation makes a deeper impression than it does when we become older and more discreet ourselves.

The more highly informed and deeply read in the history and lore of the past any one is, the more highly educated he is said to be. Getting an education consists largely, almost exclusively, in the introduction to our working psyche of an internal environment constructed from the memories of the past as set forth in a former chapter. These internal senses are largely the contribution of society.

Now recurring to the question of duty, it readily appears that the elaborate code of rules, regulations and principles is intended to be understood by the individual as his rule of duty. To these aforesaid duties is added that of taking care of himself. As soon as he is strong enough, he is expected to shoulder some of these duties. Up to this time, however, his duties are light. But at the time of his birth nothing is said about duties. He is born not merely to rights, he is born to empire. Up to the age of 14 or 16 he is recognized as possessing rights but scarcely any duties except the duty of preparing for duty. Up to that period he is under the special care of the society. Special laws are passed for his training and protection from premature labor. When the age of duty is reached, the individual receives an accession both of rights and duties. He becomes a unit in the society and has a voice in its government. He also has a right to work for himself and his family and to dispose of the proceeds of his labor, as he may see fit. He is also protected in his life and property by the body of the society. As added duty, he is required to pay taxes to defray the cost of government, and is expected to raise a family as a contribution to the perpetuation of the race. The most that the individual asks of society at this age is to get out of his way—to clear the track.

After awhile, lasting up to the age of 55 or 60, the individual becomes superannuated and unable to work. If he has not by this time saved enough from the taxeaters to keep him going, the society will furnish him with the necessities of existence

while he lives. Now such a scheme of society as this, to superficial observation, looks fair enough. But evidently it lays heavier burdens upon some than upon others. It allows the greedy and dishonest to secure more than their share. It allows the taxation of certain sections or classes, for things they do not want. It allows the formation of private organizations within the state. The charter of privilege granted by the state to private persons is certain to work injustice to the parties not included. The exemption of churches and church property from taxation, works injustice to other taxpayers. A sense of being a victim of injustice under the state begets a reduction in the sense of duty, which must be cured by an amendment of justice or the disintegration of the state itself. This is the course of history—when a sense of right and duty ceases to be included as a factor with pleasure and pain, and the whole motive dwindles to securing whatever one can get his hands on; and the loudest applause follows the most successful greed.

The toleration by the state of the organization of trusts, rings and corners, combines and mergers, provokes the retaliatory measures of labor unions, strikes and boycotts. Both classes of these aggressive organizations exist for the express purpose of furthering the interests of a fraction of the people without regard to the rights of those who do not belong to the organizations. The relationship existing between society and the individual is supposed to be one of reciprocity and fair exchange.

If society allows an unfair combination within the state to crush an individual and destroy his ability

to make his living, or sacrifice his liberty, it is the verdict of reason that the state must furnish him employment.

Duties between society and the individual are mutual. When society represented by the government, or when the government falling under the control of fanatical or selfish factions, disregards the plain rights of the individual to the use of all his time and force in his own way: society is itself to blame if the individual rebels. Another duty society owes to the individual is to educate him up to date. An unenlightened soul is in the worst sort of slavery. The state wrongs both herself and the individual, when she relegates his education to a superannuated and reactionary church, that is interested in having facts different from what they really are.

The limit of our duty corresponds with the limit of our knowledge. We have no duties outside of the relative. Nothing could be more absurd than the idea of duty toward entities with which we are not in relation, especially when such entities exist only by assumption and are assumed not merely to be unknown, but absolutely unknowable.

But, it will be demanded, if every man's duty is merely his pleasure—what is to become of society when the selfish, the criminal, the greedy and the brutal enact their pleasure? If every one sets out to assert and enjoy his pleasure, it is evident that none will be wronged, unless overpowered. The limit to which one may go in the pursuit of his pleasure is decided by experience and if necessary a resort to force. Each one's limit is that which will be tolerated by the rest. The state has the power

to mould the individual and make him what she likes. She should teach by her own example what is fair, and exact fair play from every one. But I am free to say that "society" is yet quite a long ways from the point where she can pose as an example or be in a condition to lay aside her whip. But the whip is for the purpose of producing a feeling, and it must be sufficiently apparent that a sense of duty is a feeling, in each individual case; such feeling built up by its environment; and when leading to action, consumed in the formation of a will.

Conscience.

This is a feeling, a subdivision of consciousness. It has often been regarded as something that puts us in relationship to the superhuman and mystical. But it is to be classed with the internal senses, and consists of that condition of them in which stimulations fresh from the environment beget a feeling either of harmony and approval or of the contrary. If these stimulations and the sensibilities created by them affect us intimately and personally, the consciousness thus developed is called conscience, and if the relations developed are harmonious and felt to be promotive of peace and happiness, conscience is said to approve. But if conditions are the reverse and it is felt that the new stimulations tend to subvert instead of support the former stock of internal senses, conscience becomes alarmed, and a feeling is created that the old, or first formed part of the man is about to suffer some disaster, and conscience is said to disapprove, or check, or call a

halt. The steadiness and stability of a conscience depends on the general character of the person, caution or a constitutional fear of consequences adding to its keenness. Its quality as to firmness is also largely hereditary and to that extent instinctive, and becomes a characteristic of an individual, a family or a nation. It is not a religious quality, but a purely personal and selfish one. What the man dreads by reason of his disturbed conscience is injury to himself. If he has maltreated another by bodily injury, has cheated in a horse trade, has incurred the penalties of perjury, has robbed a fund he was hired to protect, has rendered himself a fit candidate for hell; if he believes that penalties attend all these, he is conscience-smitten. If he does not believe in these penalties, he may go ahead and do all such things without any disturbance of conscience or any feeling of dread. It is evident, therefore, that conscience in detail is a matter of education. One may be educated to believe a thing is right that another may regard as wrong. It is plain, therefore, that conscience cannot supplant reason as a safe rule of conduct. It often happened in our civil war that brothers stood facing each other in the carnival of death, both suckled by the same mother, but by some accident brought up and reared under contrary influences, each equally conscientious, each ready to die or to slay for his cause.

"As the drill and education by which the organs of moral sense are differentiated are by no means infallible it follows that the organs may stand for a factitious or made up state of things which do not exist in reality, but only in the teachings we have

received; so that with the most sensitive conscience, one may have totally false ideas of duty. Conscience is therefore no sure guide and tends to keep us in the old tracks, even after we have every reason to believe them wrong."

It is also evident that the feeling, conscience, is like the will; not free. Every conscience is built up by its surroundings and more or less of it is embodied in every will. "We generally excuse a man for doing that which he is conscientious in doing. Why? Because somehow we feel he is under a compulsion and could not do otherwise. We, therefore, recognize that in obeying his conscience he is not free."

"Where our instincts embrace feelings of duty and obligation they constitute conscience and their occasional violation causes that uneasiness called **remorse**; while their frequent violation begins that subversion of them called **searing** the conscience, which ends by the substitution for them of entirely new habits of thought."

Some of the most despicable and dangerous characters have been the most conscientious and pious—as the witch-burners, religious persecutors and regulators of other people's conduct. Conscience implies the loyalty of the individual to his own standards of excellence, regardless of the bases upon which these standards are erected. It may be they are composed of feelings of reverence for what he considers to be of sacred character, or it may consist of sentiments of self-respect, and obedience to a sense of honor. What a man thinks of himself is of far greater importance than what somebody else

thinks of him. And if he can be made to respect himself to be the equal of the best, the grip of honor will bind the man to good behavior by a tie stronger than any possible fear of punishment.

We often hear one say it is his conscience that keeps him in the straight track. People do not realize that their conscience is their education and that it may conduct them by a narrow path as well as a straight one.

CHAPTER XXXI.

Is The Soul Immortal?

The question in regard to the soul or psyche that interests the greatest number of serious people is in regard to its "salvation," which includes first its immortality or restoration to life after its death, and second its safety or immunity from certain penalties which it is alleged to have incurred, by reason of crimes, sins, and misdemeanors against supernatural authorities, which are supposed to live outside of the world, yet still own it.

We need not take the trouble to discuss the question of the salvation of the soul from sin and its penalties in a future state of existence before we find out that there be such a state. After the proofs that have been given of the material nature of the soul it becomes a foregone conclusion that it is subject to all the accidents that befall other organisms; it rusts out, wears out, and decays.

But in nature and under normal conditions its wear and tear are met by its power of self repair the same as other organs and tissues. But this is an argument against immortal life because it places the soul among the other organs and invites the inference that it will fare the same as they do, and immortality is not demanded or expected for them. Our investigations do indeed prove that the same destiny awaits them all. Every organism is composed of cells or plastidules as they are often called. In complicated animal organisms these cells are not all alike; but each different sort of tissue has cells peculiar to itself, such as skin cells, bone cells, blood cells, nerve cells, muscle cells, brain cells, and many more kinds. As the blood circulates through the various tissues bearing the various elements, especially nitrogen, oxygen, hydrogen, carbon, phosphorus, iron, potassium, sulphur, etc., necessary to the support and renewal of the cells, they absorb and assimilate these elements. When they finally cease to be able to do this they decay and lose their vitality and die.

The death of an organism is frequently called its dissolution, since the different cells and component elements that had been accumulated in a single body were now scattered apart and go to feed other bodies and support other forms of life. As we descend the scale of animal life we find its organization becoming less and less complicated, the organs and tissues more simple and the cells less numerous. At length at the bottom we reach the protozoa among which we find animals consisting of but a single cell.

There can be no dissolution of a single cell into further organisms. When it grows to maturity the cell splits in two and each half grows into a complete animal and splits and repeats indefinitely. Thus each mature animal becomes two infants, and there is no death and no dead body. And so it is often said that these protozoa are immortal. But this line of life in these animals is little more than the immortality of reproduction. There are no muscles or nerves and therefore strictly speaking, no body. All the other animals including man possess not only this interminable line of reproductive cells, but also parallel with them develop and raise the vast structure of the body with its organs and tissues.

The ova and spermatozoa are in themselves protozoa, each respectively perpetuating its stock and line of life within the receptacle designated for its growth and reproduction by fission, the same as other protozoa.

The reproductive egg is formed by the mutual absorption and fusion of a spermatozoon by an ovum; and it at once begins segmentation or splitting up to form two cells, one of which contains the reproductive elements for the ova or the spermatozoa, and the other undergoes repeated segmentations and accretions of nutriment in the construction of the body during the whole period of growth from a few hours or less to 20 or 30 years depending on the sort of an animal it is. The body has nothing to do with reproduction except that it acts as the nidus or nurse for the safe deposit and nourishment of the reproductive cells until they are brought into use, and transferred to a new being.

The body does not reproduce itself and is not reproduced, but is produced by powers outside of itself; powers that limit each other and limit the development and life of the body, including the soul.

So that whatever semblance of immortality is to be found in company with the animal organism, it belongs to the vital stem of reproduction; while the body with all its parts—nervous, vascular, osseous—and all its organs—limbs, liver, sense-organs, lungs, kidneys, soul, are sentenced to a few short activities, and then dissolution.

The body, always including the soul, is the fruit of existence and like the ripe apple it falls off while the reproductive stem lives on, and produces more bodies, *ad infinitum*.

If we look backward up the line of ancestry down which we have come we see that every individual in that long line is a blood relation of ours. Considered as a race, a unit, whose growth is yet incomplete, if viewed in the direction of the past, it is immortal; that is, it is immortal thus far.

If we turn and look forward we find the conditions of the past projected on the screen of the future. What has been will be, and as long as time shall move, generation shall be added to generation. The past is ours. Its immortality by natural succession is secure. But what is such an immortality worth to us as individuals. The piece of life men experience on earth is a sample of the sort of immortality they hanker after. They want a knowing memory that will cover every incident of their lives not only of the past but the future. But our experience is that memory does not cover the past—it covers only an infinitesimal part of the present.

As to the future we do not know whether we shall have any. But if we have it must come under the conditions of the past.

There can be no immortality of bodies, nor of memory, according to nature.

Sometimes in order to let the inquirer down as gently as possible a writer has held out the sentiment that a man shall live in the memory of his good deeds, in the preservation of his good qualities and in the influences of his good and disinterested actions. No doubt all these good qualities make their impression on the man's surroundings and associations. But after the man is dead he loses interest in those things and his continued life by means of his good works or good qualities are good only to his successors, and assigns. Doubtless as long as a man lives he will enjoy the reflection of a life well spent and works well done and approved by those whose good opinion he values.

But this is a long ways from immortality. But after all, is it not near enough to get?

Schopenhauer proposed an ingenious scheme to test the value of immortality. The candidate is informed that he will be required to die and remain dead for three months at the end of which time he will be awakened and live thereafter forever. He gladly embraces these terms. But suppose at the end of the three months the call-boy forgets to call him. Since he will never know his loss, can he be said to have sustained any? His friends might have an interest in his resurrection, but certainly not he.

An immortality that does not include the whole of the candidate will be apt to prove unsatisfactory.

And yet the demand is almost always limited to the soul. Probably a different interpretation of the term is partly responsible for this. But I have shown the soul to be a material substance mostly or altogether brain and safely domiciled in the brain case or skull. The soul requires the nourishment of the materials carried in the blood, and the withholding of the regular supply for a minute will suspend sensibility. Disconnected from the rest of the body it would die in a very short time.

The immortality of the soul or even its temporary or momentary existence apart from the rest of the body is so impossible as to be unthinkable. The immortality of the soul considered as the immortality of its acts, its thoughts, its feedings, its will and all its other functions, is equally impossible excepting by the transference of life spoken of above, in which the results of our acts and qualities persist by being incorporated with those of the race. These actions of the soul or psyche in the production of feeling, thought, reason, etc., collectively called the mind, are by many people not distinguished from the active material organ—the soul—that produces them and so they erroneously speak of the immortality of the soul as meaning the mind, thought, feeling, etc. The part that thinks, like a leg or any other organ, wastes away, decays and dies. As a material organ it could not do otherwise. Neither, when it is still in death, can feeling and thought continue to be born. Nor does any that ever was born, exist a moment after it was written down. The immortality of mind and thought is as pre-

posterior as the immortality of a bugle blast or a streak of lightning, or the squeak of an uncoiled bearing.

A Tale of a Tree.

Once on a time a boy went on horseback a few miles to a neighboring plantation to visit some friends. Before starting on his return he rode up to a fine willow tree near the house and cut a shapely and thrifty switch. As he rode away one of his friends called to him, "John, stick that switch in the ground when you get home and you will soon have a willow tree of your own." He adopted the suggestion, planting it in a commodious place. He dug the soil and watered it and in a few days it put forth leaves. He became interested to see it grow and the first season it pushed its roots deep in the soil and grew higher than John's head and sent out many little twigs and branches. Year by year it continue to flourish and it became a mighty shade tree, and John put a fence around it with a neat gate, and put inside of it some rustic chairs made from surplus limbs of the tree, and the little retreat became a favorite resting place for John and the rest of the family. And many pleasant hours they spent there in the cool shade.

Years and years went by, at last John sickened. With his latest breath he said, "Bury me in the shade of the willow tree." They did so and left him there and often people at night fancied they could see his ghost sitting on one of the rustic chairs as he used to do.

More years rolled by. At last the tree began to droop and languish, many of the leaves fell off, the bark peeled, and the limbs decayed and dropped. Soon it was dead. The friends consulted each other and said John should be moved. His grave was no longer in an appropriate place. So they dug down to the coffin—a wooden one, and there they found a strange phenomenon. All the coffin except some rusty nails and metal handles, was gone. The space it had filled was now occupied by the skeleton perfectly polished and cleansed from all the soft parts and densely cushioned and surrounded by fine fibrous roots from the willow tree. And they were dry and dead. Undoubtedly they had sucked up and incorporated with the sap of the tree, the chemically rich juices of the grave. One stout root had crept up the breast bone to the nose and dividing at the bridge, one prong on each side had found its way to an eye and thence sent fibers into the skull, by which the whole of the brain—the soul—had been removed, leaving the brain case filled with the dry fibres.

No doubt the flesh-eating tree, literally a sarcophagus, had gorged itself upon too much rich food, the rebound from the failure of which, when it failed, would result in starvation.

Do we not find in this example of the disastrous association of a psyche with the machinery of a tree another proof of the materiality of the soul.

Death is no respecter of persons. The sarcophagus is no respecter of souls.

It is no use to mince matters. The proofs that the soul—the very part that feels and thinks is as

material as a hand or foot or liver are overwhelming. The soul is irrefragably identified with the brain and nervous system. We do not need to speculate about its destiny. Being material it is mortal. Daily its dissolution goes on right before our eyes. When neither muscles nor glands nor heart nor blood nor lungs are spared from dissolution why should we expect the soul to be? As a fact the soul cannot survive separation from the body and the blood for the space of a minute. There is no chance to be mistaken here. The soul is a part of the body, is born, lives, grows, decays and dies when it does. Tell the truth. Face the conditions as they are. It is idle to dream of delights in facts that never could possibly happen. No matter how desirable or whether desirable at all, the doctrine of immortality is a myth; to be classed with metempsychosis. Nor do we need it.

It requires no courage to die, when we realize that death is divested of the lying terrors with which it has been invested by interested fraud. When one realizes that he will never wake to face a frowning god, or a gloating devil, a scorching hell, or a frigid heaven, he can cheerfully go to sleep.

Nor if men will learn how to live, will they ever die before they are ready, or before they have exhausted all the delights of life.

CHAPTER XXXII.

A Suggestion on Gravity.

There are two general classes of energy and causes of motion, viz., **attraction** and **repulsion**. The first tends to consolidate and pack matter in smaller compass, the other tends to rupture and disperse matter.

Attraction goes under several names—as gravity, cohesion, chemism, electrical, magnetic, etc.

The dispersing agents are heat and centrifugal motion, electrical, chemical and magnetic repulsion.

Attraction tends to create motion of bodies from a position of potential energy down to an unwinding of such energy in a position of no potential. Repulsion tends to move bodies off and place them in positions of potential energy. We might call them homeward bound and outward bound forces. Both of these two classes of motion beget energy or capacity for work and we utilize both kinds in our multifarious operations and mechanical enterprises. By means of a dam or waterfall we take advantage of the force of attraction.

By using steam we take advantage of repulsion. These two grand divisions of energy are complementary of each other, the one constantly and alternately undoing what the other one does. Their actions and interactions are involved and complicated with each other in nature, inextricably.

Bodies attracted by gravity to fall against each other are repelled by the heat generated as the con-

tinuance of the motion of the fall and when so repelled lose their gravity as they move off. A certain temperature is therefore essential to weight. In a universe of gas, bodies, or particles rather, fly apart, gravity in them is proportionally destroyed, and is restored only after a reversal of the repulsion by cooling off effects its restoration.

Now this repulsion is caused by the action of the ether in shoving the hot particles away from each other.

Then gravity must be the opposite and acts by pulling the particles back again after they have lost their heat and the repulsive strain is relieved.

In radiating heat-motion, (undulation), to the limits of the sun's influence, i. e., the solar system, it must be that the undulating motion becomes almost infinitely less at the extreme edge of the solar system than at the center, the undulations spreading both laterally and vertically and becoming of vastly greater tenuity. These undulations meet those from the neighboring solar systems, and establish selvages at the neutral lines or lines of stillness or balanced attraction. What happens there no man knows.

Cohesion.

On P. 54, "First Principles," Mr. Spencer gives us a specimen of metaphysical reasoning after an assumed example of Boscovich, involving the theory of the attraction of cohesion. It is assumed first that a body is held together by cohesion. Then if the body is divided each fragment is held together by the same force, and so on, "Carry the process in

thought as far as we may, until the extension of the parts is less than can be imagined, we still cannot escape the admission of forces by which the extension is upheld, and we can find no limit until we arrive at the conception of centers of force without any extension." (?)

Probably from cases like the above some people have fallen into the error of "centers of force," of force deprived of matter, the matter being obliterated and dispersed, leaving the force behind. In this case the absurdity of the conclusion arises from the assumption of the reality of the attraction of cohesion.

If we take a couple of pieces of pine wood one cubic inch in size and submit one to a tension strain that will split it with the grain, and the other to a strain in the direction of the grain that will pull it apart, it will probably be found that the latter requires ten or twenty times as much force as the former. If it is the attraction of cohesion that held the particles together there should not be any difference. If after the fracture the pieces are pressed together as closely as possible, they will not adhere the attraction will be gone. There never was any. The fact is that substances are held together by the interlocking of their molecules; or cells in such a case as the above. Wood cells are often several hundred times longer than their diameter, and they break joints, adding immensely to their strength in a longitudinal direction.

The so-called attraction of cohesion of a body, is probably no more than the proportion of gravitation due to a body of such weight, considered by

itself, in comparison with the whole world considered as a unit.

It would, therefore, come under whatever law is found to govern gravity. Its amount for such small bodies as we have to deal with is infinitesimal.

As said above, I think the force that holds the molecules of bodies together is not due in any considerable degree to attraction after the body is once formed, but rather to the interlocking of their particles. Bodies are formed into homogeneous masses by fusion—as of iron. In that state, the molecules fall together by gravity or chemism and interlock. There is no cohesion in an incandescent gas. Gravity attracts the mass regardless of its condition as to coherency.

The facts in regard to the coherency of water, ice and steam, recited in chapter six, strongly support this hypothesis. Thus it requires 143 degrees of heat to pull apart the molecules of ice and convert it into water. To pull apart the molecules of boiling water and convert it into steam requires the expenditure of 967 degrees of heat. To ascribe such phenomena as that to cohesion, is to make it a very uncertain and capricious agency.

Heat (including light) is the undulatory motion of the ether, which motion transferred or imparted to the molecules of the gas cause them to vibrate at a rapid rate giving rise to what is called their "velocities." These velocities cause the molecules to collide and hustle each other apart, and produce their repulsions, and the expansion of the body as a whole. When this expansive process is exhausted and the elements cool off, attraction, a complemen-

tary motion of the same ether, pulls them back again.

So repulsion by heat does not reside in the repelled particles, or bodies, but arises from the activity of the ether, and likewise we shall find that weight does not reside in the bodies weighed but represents the force of the pull of the ether in its contractile or attractive capacity. When this pull is exhausted and the motion of the falling body is arrested the motion reappears in heat and expansion, and the process is repeated—indefinitely.

There are many facts and experiments that point to the conclusion that the solar radiations are of a duplex nature and are at once both negative and positive. Experiment has shown that a powerful jet of fluid in one direction, divides, and part of it returns. (See D. T. 340-2.) In electric currents this double movement is well understood by electricians and is denominated negative and positive electricity. These currents run in opposite directions, the negative toward the source of the energy, and the positive away from it. Neither of these can be created without giving rise to the other. Electricity is closely akin to heat and light, often originating from them and often giving rise to them. It is intimately mixed up with them in the solar radiations. Its rate of motion is the same as that of light, viz., 186,000 miles per second. Heat and light are in reality sensations of ours, parts of our minds, but they arise from the undulatory vibrations of short wave lengths of the ether at certain rates which are known. These undulations of the ether are also called light and heat, and it is of them that we now

speak—and not our sensations that arise from them. It is not known what sort of motions of the ether constitute electricity. That it is one of the modes of ethereal motion, however, is not for a moment doubtful. It may possibly be a current, as it appears to be in electrolysis.

Anyhow it is projected from the sun along with the others, and by some mode travels as far and as fast as they. Now the motion or force of gravity is probably the negative moiety of the electricity generated in the sun, modified and influenced by the other forms of energy as to quantity, uniformity, rate, etc. For, considering the intimacy of these forces, it appears that they might all contribute directly or indirectly to the development of gravity. In all probability in the outer regions of space, under the changed conditions there, the lower tones of heat become changed into electricity and so stream back to the sun, to be there arrested and reduced to heat and so repeat indefinitely.

That some such process goes on is rendered probable by the fact that the sun is radiating its heat away so rapidly that if it had no income it would last but a few millions of years, whereas, it is now many hundreds of millions of years old, and as suns go, it looks like a young sun yet.

Newton says action and reaction are equal. "If you press a stone with your finger the finger is also pressed by the stone. And if a horse draws a stone tied to a rope; the horse (if I may so say), will be equally drawn back toward the stone," etc. This is much the same as saying that resistance is equal to the force by which it is overcome and this again

is only asserting the conservation of forces. May not this consideration also help the conceit of a duplex constitution for gravitation.

The electric and radiant energy exercised by the sun on the earth and the other planets, no doubt, makes them all magnets by induction, thus insuring uniformity in the physical principles governing them and giving to each a law of gravity. This would make gravitation, so far as our solar system is concerned, to depend on our sun's stock of radiant energy; and while it is assumed that this would be used without being wasted or dissipated it would be practically everlasting.

It must be due to some constant and long enduring dynamic agency.

If the sun's radiation of energy is the cause we may count on its lasting as long as the sun is a self-center of energy. Without waste, this is practically for ever.

Of course, we must suppose every sun in the universe likewise to possess a like endowment of radiant energy, each shooting its heat and light into space and getting its return in the suction of gravitation, holding the planets to their allegiance and pulling in by its grappling hooks the matter that had been carried off by its heat, or that may have been left over like spawls, meteorites, and scraps from the beginning.

Of course, the earth and other planets not having a store of original energy of their own, depend on that which the sun's energy furnishes them, and attract by borrowed force just as they shine by borrowed light.

By this hypothesis as the radiation from any sun becomes reduced and spent he loses his grip on his satellites and they might wander off into the sphere of some other sun or suns and perhaps fall into one and be melted over again, or the whole system might pass within the attractive influence of a great orb and be re-supplied with a fresh store of heat. A collision that would involve any number of cold globes would disperse the materials into an incandescent gas, fit to begin a new solar system. Under any theory, however, some such fate awaits all worlds.

I do not offer these speculations on gravity as a theory or even an hypothesis, but merely as suggestive; in the hope that somebody more able and better equipped than I, will take it up and see if there is anything in it.



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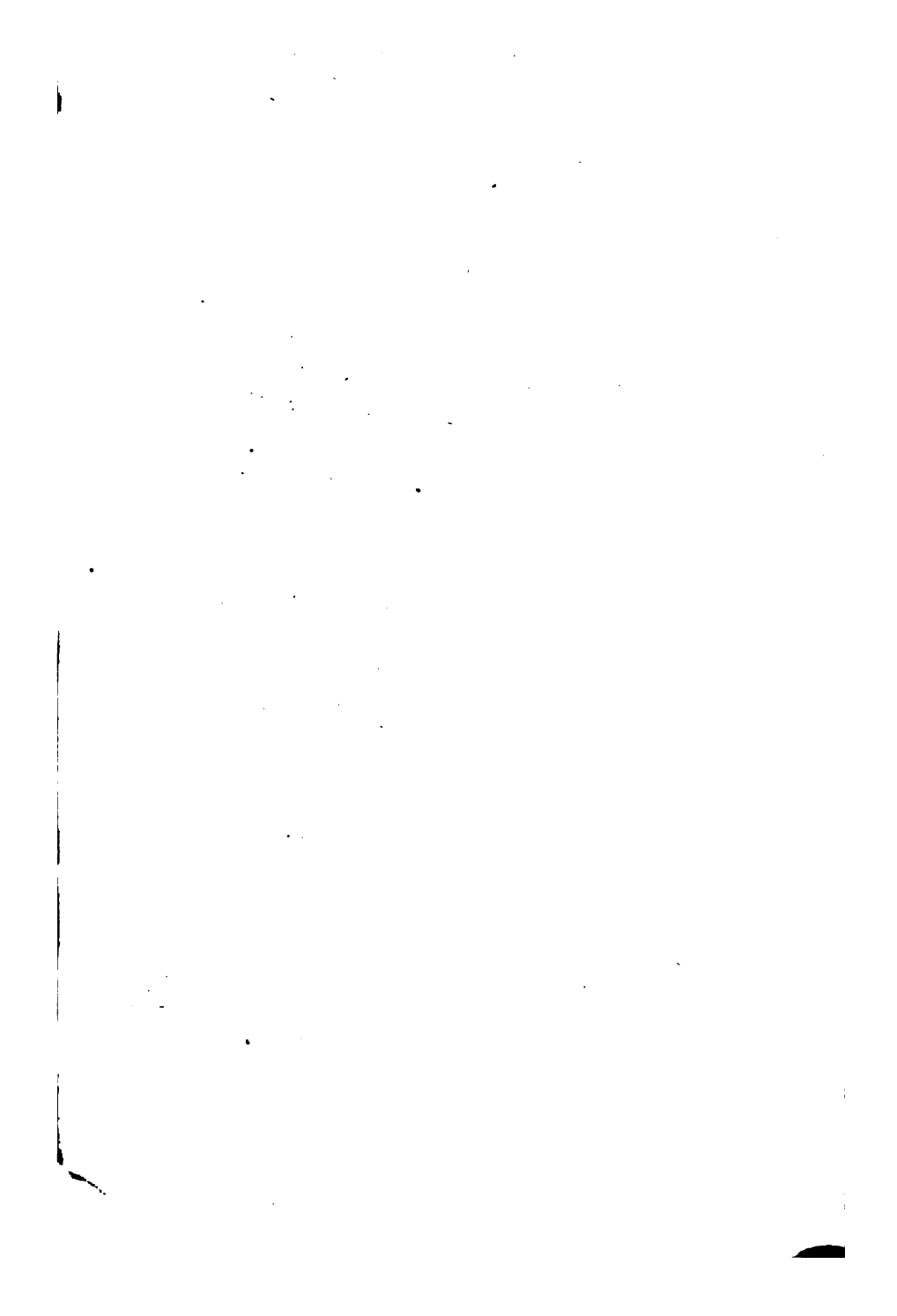
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